Seat No.

B.Sc. – I (Semester – I) (CGPA) Examination, 2016
ENGLISH COMPULSORY
On Track English Skills for Success

Day and Date : Tuesday, 22-3-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

N. B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences by choosing the correct alternative :   **14**

    1) The name of the policeman on the beat was _____
        a) Jimmy Wells   b) Jimmy Porter
        c) Jimmy Wel   d) Jimmy Pals

    2) Twenty years ago, Jimmy and Bob dined at _____
        a) Big John Brady's Restaurant
        b) Big Boss Restaurant
        c) Big Joe Brady's Restaurant
        d) Big John Brandy's Restaurant

    3) The writer and Miss Krishna _____
        a) Were at school together
        b) Met at an exhibition
        c) Met at a tea party
        d) Were neighbours

    4) From what she tells the writer, it is clear that Miss Krishna's life with her mother was _____
        a) Miserable   b) Comfortable
        c) Very happy   d) Difficult

    5) According to Binet, a psychologist who developed the _____ test.
        a) G. K.   b) I. Q.
        c) S. T. S.   d) S. T. I.

6) The word 'intelligence' is derived from the Latin word _____
   a) intellegere   b) intellect
   c) intellectual   d) none of the above

7) What does 'shining loads' mean ?
   a) an unmarried woman's wrist
   b) bunches of bangles
   c) the flame of a marriage fire
   d) sunlit corn

8) Where are the bangle sellers carrying their wares ?
   a) To a married woman's house
   b) To the house of a maiden woman
   c) To a temple fair
   d) To the streets

9) An Irish Airman Foresees His Death is written by _____
   a) W. B. Yeats   b) W. B. Keats
   c) John Henry   d) Sarojini Naidu

10) The Speaker in the poem 'An Irish Airman Foresees His Death' belongs to _____
    a) Switzerland   b) Ireland
    c) Newzealand   d) England

11) Salma is a _____ noun.
    a) Proper   b) Common
    c) Collective   d) None of the above

12) They are happy to see her dancing. The underlined word is _____
    a) Nouns   b) Pronouns
    c) Prepositions   d) Conjunctions

13) Prema is fond _____ dancing.
    a) of   b) to
    c) on   d) by

14) Anu is _____ Sania Mirza of our college.
    a) a   b) the
    c) an   d) no article

2. Answer **any seven** of the following questions in **two** or **three** sentences **each** :   **14**

   1) What sort of relationship did Bob and Jimmy Share ?

   2) Why does Jimmy send another policeman to arrest Bob ?

   3) What is the meaning of the title 'Connoisseur' ?

   4) Why did the narrator consider Miss Krishna an annoying guest ?

   5) What are the many facets of intelligence ?

   6) What are the merits of artificial intelligence ?

   7) Which are the preferred colours for the bangles of a newly married woman ?

   8) Who is the Speaker in the poem 'An Irish Airman Foresees His Death' ?

3. A) Write short paragraphs on **any two** of the following :   **8**
   1) My family.
   2) Solar energy.
   3) My favourite book.

   B) Answer **any three** of the following questions briefly :   **6**
   1) What is the central idea of the poem 'Bangle Sellers' ?
   2) What is the Irish airman's attitude towards the war he is fighting in ?
   3) What are the myths regarding the intelligence of computers ?
   4) What do you understand of Miss Krishna's childhood from the story ?

4. Write an essay on **any one** of the following topics.   **14**

   1) The role of women in the modern society.

   2) The benefits and drawbacks of mobile phones on the lives of young people in the present day.

5. Read the following passage carefully and make a note of it.   **14**

Everyone knows that taxation is necessary in a modern state : without it, it would not be possible to pay the soldiers and policemen who protect us ; nor the workers in government offices who look after our health, our food, our water and all other things that we cannot do for ourselves; nor also the ministers and members of parliament who govern the country for us. By means of taxation, we pay for things that we need just as much as we need somewhere to live and something to eat.

But though everyone knows that taxation is necessary, different people have different ideas about how taxation should be assigned. Should each person have to pay a certain amount of money to the government each year ? Or should there be a tax on things that people buy and sell ? If the first kind of taxation is used, should everyone pay the same tax, whether he is rich or poor ? If the second kind of tax is preferred, should everything be taxed equally ?

In most countries, a direct tax on persons, which is called income tax, exists. It is arranged in such a way that the poorest people pay nothing and the percentage of tax grows greater as the tax-payer's income grows. In England, for example, the tax on the richest people goes up as high as ninety-five percent !

But countries with direct taxation nearly always have indirect taxation too. Many things imported into the country have to pay taxes and duties. Of course, it is the men and women who buy these imported things in the shops who really have to pay the duties, in the form of higher prices. In some countries, 400, there is a tax on things sold in the shops. If the most necessary things are taxed, a lot of money is collected, but the poor people suffer most. If unnecessary things like jewels and fur coats are taxed, less money is obtained, but the tax is fairer, as the rich pay it. Probably this last kind of indirect tax, together with a direct tax on incomes which is low for the poor and high for the rich, is the best arrangement.

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Seat No.	

B.Sc. – I (Semester – I) Examination, 2016
CHEMISTRY (Paper – I) (CGPA Pattern)
Physical and Inorganic Chemistry

Day and Date : Wednesday, 23-3-2016   Max. Marks : 70

Time : 10.30 a.m. to 1.00 p.m.

Instructions :   1) **All** questions are **compulsory**.

2) Draw neat, labelled diagrams **wherever** necessary.

3) Figures to the right indicate **full** marks.

4) Use of log table and calculator is **allowed**.

SECTION – I

(Physical Chemistry)

1. Select the correct alternative for the following and rewrite the sentences :   **5**

   i) Reaction between $K_2S_2O_8$ and KI is an example of _____ order reaction.

      a) First   b) Second

      c) Zero   d) Third

   ii) In cyclic process

      a) q = 0   b) q = w

      c) q = + ve   d) q = – ve

   iii) $\left(P + \dfrac{a}{v^2}\right)(v - b) = RT$ is known as _____ equation.

      a) ideal gas   b) kinetic gas

      c) rate constant   d) vander waal's

   iv) Integration of dx is

      a) x   b) x + c

      c) x – c   d) log x

v) The point of intersection of x and y axes in the graph is known as

   a) origin   b) intercept

   c) slope   d) quadrant

2. Answer **any five** of the following :   **10**

   i) Give any two statements of second law of thermodynamics.

   ii) What are the requirements for liquefaction of gases ?

   iii) Plot the graph of log (a – x) against time (t) using equation $K = \dfrac{2.303}{t} \log \dfrac{a}{a - x}$. Find the value of slope.

   iv) Define the terms ideal and non-ideal gases.

   v) Define the term intercept of straight line.

   vi) What is molecularity of a chemical reaction ?

   vii) What is definite and indefinite integral ?

3. A) Write short notes on **any two** of the following :   **10**

     i) Pseudo unimolecular reactions

     ii) Spontaneous and nonspontaneous processes.

     iii) Simple rules of derivative.

  B) Answer **any one** of the following :   **10**

   i) What is order of reaction ? Derive an equation for second order reaction with equal concentration of reactants. A second order reaction, where a = b is half completed in 60 minutes. In how much time it will be 90% completed ?

   ii) What is an isotherm ? Explain Andrew's isotherms for CO_2. Calculate the critical temperature of a gas from the following data.

   a = 1.406 N m^{-2} dm^6 mol^{-2}

   b = 9.94 x 10^{-5} dm^3 mol^{-1}

   R = 8.314 J K^{-1} mol^{-1}

SECTION – II

(Inorganic Chemistry)

4. Select the most correct alternative for the following and rewrite the sentences :   **5**

   1) As atomic size increases, ionization potential
      a) increases
      b) decreases
      c) first increases then decreases
      d) remains constant

   2) Among the halogens _____ is the most reactive.
      a) F   b) Cl
      c) Br   d) I

   3) The strength of covalent bond depends upon
      a) number of electrons   b) types of orbitals
      c) extent of overlapping   d) types of hybridization

   4) The bond order of Li_2 is
      a) 1   b) 1.5
      c) 2   d) 0

   5) The limiting radius ratio for octahedral geometry is
      a) 1.00   b) 0. 732 – 1.00
      c) 0.155 – 0.225   d) 0.414 – 0.732

5. Answer **any five** of the following :   **10**

   i) Give the importance of Born-Haber cycle.

   ii) State and explain Pauli's exclusion principle.

   iii) Draw the shapes of d-orbitals.

   iv) Give the limitations of VBT.

   v) Draw orbital diagram of $BeCl_2$ molecule.

   vi) Explain S-S overlap.

   vii) Give MO diagram of H_2 molecule.

6. A) Write short notes on **any two** of the following : **10**

    i) What is atomic radius ? Discuss its trends in a period and in a group in the Periodic table.

    ii) Explain the formation of SF_6 molecule on the basis of VBT.

    iii) On the basis of VSEPR theory explain the formation of H_2O molecule.

  B) Answer **any one** of the following : **10**

    i) With the help of MO diagram explain bond order, stability and magnetic character of C_2 and NO molecules.

    ii) What is ionic bond ? Discuss the structure of NaCl with respect to radius ratio, unit cell, co-ordination number and stoichiometry.

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SLR-W – 3

Seat No.	

B.Sc. – I (Semester – I) (CGPA Pattern) Examination, 2016
COMPUTER SCIENCE (Paper – I)
Computer Fundamentals and Programming Using 'C' – I

Day and Date : Wednesday, 23-3-2016   Max. Marks : 70

Time : 2.30 p.m. to 5.00 p.m.

Instructions :   1) **All** questions are **compulsory**.
                2) Figures to the **right** place indicate **full** marks.

SECTION – I

(Computer Fundamentals)

1. Choose correct alternative :   **5**

    1) ASCII stands for
        a) American Standard Code for Information Interchange
        b) American Security Code for Information Interchange
        c) American Scientific Code for Information Interchange
        d) American Standard Code for Interchange Information

    2) The binary system uses power of
        a) 2   b) 8   c) 10   d) 16

    3) Which of the following is not a binary number ?
        a) 001   b) 101
        c) 202   d) 110

    4) ALU and control unit jointly known as
        a) RAM   b) ROM
        c) CPU   d) PC

    5) The most common input device is
        a) Scanner   b) Keyboard
        c) Light Pen   d) Joystick

P.T.O.

2. Answer **any five** of the following : **10**

   1) List the applications of computer system.

   2) Give the components of motherboard.

   3) Differentiate bit and byte.

   4) What is multitasking ?

   5) What are input devices ?

   6) List the internal DOS commands.

   7) Define interpreter.

3. A) Write a short notes on **any two** of the following : **10**

   1) What is operating system ? Explain various functions of operating system.

   2) Explain the basic organization of computer in details.

   3) List out the various computer generation along with key characteristics of the computers of each generation.

   B) Answer **any one** of the following : **10**

   1) What is printer ? Explain non-impact printers with suitable example.

   2) What is memory ? Explain in detail.

SECTION – II

(Programming Using 'C' – I)

1. Choose correct alternative : **5**

   1) Character constants should be enclosed between double quotes.

      a) True   b) False

   2) Symbolic constants can be defined using

      a) # define   b) const

      c) symbols   d) none of these

   3) Maximum number of elements in the array declaration int a[5][8] is

      a) 28   b) 32   c) 35   d) 40

   4) The meaning of break and continue statements are same.

      a) True   b) False

   5) The 'C' language consists of _____ number of keywords.

      a) 32   b) 40   c) 24   d) 56

2. Answer **any five** of the following : **10**

   1) What is a pre-processor ?

   2) What are identifier and keywords ?

   3) Differentiate with example ++i and i++.

   4) Explain printf ( ) and scanf ( ) function with an example.

   5) List out applications of 'C' language.

   6) Give the syntax and example of switch statement.

   7) What is the nested for loop ?

3. A) Write a short notes on **any two** of the following : **10**

   1) What is looping in C ? What are the advantages of looping ?

   2) What is array ? How to declare array ? Explain with suitable example.

   3) Explain flowchart with the suitable example.

  B) Answer **any one** of the following : **10**

   1) Write a program to check given number is prime or not.

   2) What is type casting ? Explain it with suitable example.

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SLR-W – 4

B.Sc. (Part – I) (Semester – I) Examination, 2016
PHYSICS (Paper – I) (CGPA Pattern)
Mechanics and Properties of Matter, Optics and Laser

Day and Date : Saturday, 26-3-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions :   i) **All** questions are **compulsory**.
　　　　　　　ii) Figures to the **right** indicate **full** marks.
　　　　　　　iii) Neat labelled diagrams must be drawn **wherever** necessary.
　　　　　　　iv) **Use** of log table and calculator is **allowed**.

SECTION – I
(**Mechanics and Properties of Matter**)

1. Select the correct answer from the given alternatives :   **5**

   i) Moment of inertia of the disc about its diameter is _____ of the moment of inertia of disc about the axis passing through its centre and perpendicular to its plane.

   　a) exactly half   b) less than that

   　c) twice that   d) greater than that

   ii) At minimum time period of compound pendulum, length of equivalent simple pendulum is equal to

   　a) $L = K$ b) $L = 2K$ c) $l = K$ d) $L = l' + l$

   iii) The relation between elastic constants y, η and k is

   　a) $\dfrac{1}{y} = \dfrac{3}{\eta} = \dfrac{9}{k}$ b) $\dfrac{9}{y} = \dfrac{1}{\eta} = \dfrac{3}{k}$ c) $\dfrac{9}{y} = \dfrac{3}{\eta} = \dfrac{1}{k}$ d) $\dfrac{3}{y} = \dfrac{1}{\eta} = \dfrac{9}{k}$

   iv) If T is surface tension of soap solution then the excess pressure inside its bubble of radius r is

   　a) $P = \dfrac{2T}{r}$ b) $P = \dfrac{T}{4r}$ c) $P = \dfrac{T}{2r}$ d) $P = \dfrac{4T}{r}$

   v) Dimensions of coefficient of viscosity are

   　a) $[M^1 L^{-1} T^{-1}]$ b) $[M^0 L^1 T^{-1}]$ c) $[M^1 L^0 T^{-2}]$ d) $[M^1 L^1 T^1]$

2. Solve **any five** of the following :   **10**

   i) Write down the dimensions and unit of moment of inertia.

   ii) Rectangular lamina of metal sheet having length 40 cm, breadth b = 32cm and mass per unit area $\sigma = 6$ gm/cm^2 is rotated about an axis coinsiding with one of the longside. Then find its M.I. about that axis.

   iii) What is compound pendulum ? Give its formula for periodic time.

   iv) Give the SI and CGS unit of Young's modulus.

   v) Define the term Poisson's ratio. Give its limiting values.

   vi) Define surface tension and give its unit.

   vii) Define the term viscosity and give its SI and CGS units.

3. A) Solve **any two** of the following :   **10**

   1) Write a short note on flywheel.

   2) Write a short note on torsional pendulum.

   3) If a copper is having bulk modulus k = 14 × 10^{10} N/m^2 and rigidity modulus $\eta = 4.2 \times 10^{10}$ N/m^2. Then calculate its Young's modulus.

   B) Solve **any one** of the following :   **10**

   1) What is compound pendulum ? Derive an expression for the length of its equivalent simple pendulum. Prove that the centre of oscillation and centre of suspension of the compound pendulum are interchangeable.

   2) Derive the Poiseulle's equation for rate of flow of an ideal liquid $V = \dfrac{\pi p a^4}{8 \eta l}$.

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SECTION – II
(**Optics and Laser**)

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1. Select and write the most appropriate answer from the given alternatives for **each** sub-question :   **5**

   i) By Fermat's principle of least time, the time of traverse for a light ray travels between two points in same medium is

   a) maximum   b) minimum

   c) optimum   d) extremum

   ii) The condition of destructive interference due to reflected light for parallel faced thin air film is : path difference Δ is equal to

   a) $n\lambda$ b) $n\dfrac{\lambda}{2}$ c) $(2n + 1)\dfrac{\lambda}{2}$ d) $(2n + 1)\lambda$

iii) When a point source of light is used then in Fresnel's type diffraction the edge of an obstacle is illuminated by

   a) plane wavefront   b) cylindrical wavefront

   c) spherical wavefront   d) elliptical wavefront

iv) In Ruby Laser, the type of pumping used is

   a) mechanical   b) chemical   c) electrical   d) optical

v) In Ramsden's Eye-Piece, the field lens and eye lens are co-axially separated by distance of 8 cm. The focal length of this Eye-Piece is

   a) 12 cm   b) 9 m   c) 6 cm   d) 3 cm

2. Answer **any five** of the following :   **10**

  i) State the condition for achromatism for a combination of two thin co-axial lenses kept in contact.

  ii) What are the different parts of an optical instrument 'spectrometer' ?

  iii) Distinguish between : Ramsden's Eye-Piece and Huygen's Eye-Piece.

  iv) Describe any two properties of a Laser Source of light.

  v) Define Einstein's coefficient of absorption of radiation.

  vi) How to prepare a replica of the original plane diffraction grating ?

  vii) When in Newton's Rings Experiment airfilm is replaced by liquid film, the diameter of 5th ring changes from 0.2 cm to 0.17 cm. Calculate refractive index of the liquid.

3. A) Answer **any two** of the following :   **10**

   i) Explain the construction of the Huygen's Eye-Piece and derive an expression for the focal length of it.

   ii) Describe the construction and working of Helium-Neon Laser.

   iii) A parallel beam of monochromatic light is incident normally on a plane diffraction grating having 15000 lines per inch and 2nd order spectral line is deviated through an angle of 30°. Calculate the wave length.

  B) Answer **any one** of the following :   **10**

   i) Using Fermat's principle, deduce the Snell's law of refraction.

   ii) Explain the phenomenon of interference of light in a thin wedge shaped air film and derive an expression for the fringe width. When the wave length of monochromatic source of light used is 6000A° then calculate the thickness of air film where 10th dark fringe is observed.

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Seat
No.

B.Sc. (Part – I) (Semester – I) (CGPA) Examination, 2016
GEOGRAPHY
Physical Geography – Geomorphology (Paper – I)

Day and Date : Saturday, 26-3-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

N.B. : 1) **All** questions are **compulsory**.
      2) Draw neat diagrams **wherever** necessary.
      3) Use of stencils is **allowed**.
      4) Figures to the **right** indicate **full** marks.

SECTION – I

1. Select the proper answer from the given below and rewrite the sentences.   **5**

   1) The bright planet in our solar system is _____

     a) Mars   b) Jupiter   c) Venus   d) Saturn

   2) The _____ is the satellite of earth.

     a) phobos   b) moon   c) titan   d) deimas

   3) The average density of the whole earth is about _____ gm/cm^3.

     a) 5.5   b) 6.5   c) 7.5   d) 7.9

   4) _____ is a example of metamorphic rock.

     a) Dyke   b) Laccolith   c) Marble   d) Sills

   5) _____ discontinuity is found in between core and mantle.

     a) Conrad   b) Mohovisic   c) Guttenberg   d) None of them

2. Answer **any five** of the following.   **10**

   1) Give the name of all planets sequentially in solar system.

   2) Describe the term 'Lithosphere'.

   3) Explain the 'focus' and 'epicentre' terminology in the earthquake.

4) Characteristics of primary waves.

5) State the economic importance of igneous rocks.

6) Give the types of Earth movement.

7) E. Suess classification of interior earth.

3. Write a short notes on **any two** of the following. **10**

1) Classification of Vertical forces with examples.

2) State the formation process of sedimentary rocks.

3) Tidal Hypothesis of origin Earth.

4. Answer **any one** of the following. **10**

1) Explain the term 'Earthquake' and state its causes with its effects on the earth surface.

2) Define rock and state its classification with good examples.

SECTION – II

1. Select the proper answer from the given below and rewrite the sentences. **5**

1) Whenever the rocks are disintegrated and decomposed due to the living organisms, then it is known as _____ weathering.

   a) Physical   b) mechanical   c) chemical   d) biotic

2) The removal of soil minerals and colloids from the upper horizons is called _____ process of soil formation.

   a) eluviation   b) silication   c) salinization   d) pe-doturbation

3) _____ are formed in the deposition work of river.

   a) Gorges   b) Canyon   c) Waterfall   d) Delta

4) Zeugen and yardangs are frequently found in arid region due to the erosional work of _____

   a) river   b) underground water

   c) wind   d) glacier

5) Whenever the proportion of sand particles is more than 70 to 80% with less than 20% of silt and clay particles in the soil, then it is known as _____ soil.

   a) clayey soil   b) course sandy loam

   c) silt loamy soil   d) sandy clay

2. Answer **any five** of the following.   **10**

1) Micronutrient in the soil.

2) Difference between erosion and weathering.

3) Function of soil.

4) Give the name of all landforms formed in the depositional work of river.

5) Types of sand dunes.

6) Draw the neat diagram of 'flood plain'.

7) Classify the soil on the basis of its colour.

3. Write short notes on **any two** of the following.   **10**

1) Define soil and give its significance.

2) State the various landforms in the erosional work of wind.

3) What is meant by texture of soil ? Classify it on the basis of texture.

4. Answer **any one** of the following.   **10**

1) Define weathering and explain any one type of weathering briefly.

2) Describe the various land forms formed in the erosional work of river.

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Seat No.

B.Sc. – I (Semester – I) Examination, 2016
(C.G.P.A. Pattern)
STATISTICS (Paper – I)
Descriptive Statistics, Probability and Probability Distributions – I

Day and Date : Monday, 28-3-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m

N.B. :   1) *Figures to the **right** indicate **full** marks.*
       2) *Answers of **two** Sections should be written in **same** answer book.*

SECTION – I
(Descriptive Statistics, Probability)

1. Choose the correct alternative :   **5**

   1) Variables are measured using
     a) Nominal scale   b) Ordinal scale
     c) Interval and ratio scale   d) None of these

   2) In an individual series if each observation have same value, then
     a) AM < GM < HM   b) AM > GM > HM
     c) AM = GM = HM   d) None of these

   3) In order to compare the variability of different groups, the best measure of dispersion is
     a) Range   b) Mean deviation
     c) Coefficient of variation   d) None of these

   4) The second order central moment in terms of raw moments is
     a) $\mu_2' - \mu_1'^2$ b) $\mu_2' - \mu_1'$
     c) Both a) and b)   d) None of these

   5) The measure of kurtosis β_2 for a leptokurtic curve is
     a) Less than 3   b) Greater than 3
     c) Equal to 3   d) None of these

P.T.O.

2. Answer **any five** of the following : **10**

   i) Define qualitative data and quantitative data.

   ii) Define class limits and mid-points.

   iii) Define G.M. and H. M.

   iv) State any two properties of A. M.

   v) Define mean deviation and standard deviation.

   vi) Define mean square deviation and state its minimal property.

   vii) Write a note on Skewness.

3. A) Write short note on **any two** of the following : **10**
   i) Explain the construction of cumulative frequency curve.
   ii) What is the effect of change of origin and scale on arithmetic mean ?
   iii) Define coefficient of variation and explain its utility.

   B) Answer **any one** of the following : **10**
   i) Define median and derive the formula for finding the median for a grouped frequency distribution.
   ii) Define raw moments and central moments. Obtain the first four central moments in terms of raw moments.

SECTION – II
(Probability Distributions – I)

4. Choose the correct alternative : **5**

   1) For a classical definition of probability the sample space must be
      a) Discrete
      b) Continuous
      c) Finite with equiprobable sample space
      d) None of these

   2) Which of the following is the power set corresponding to sample space $\Omega = \{1, 2\}$?
      a) $\{ \{ \}, \Omega \}$
      b) $\{ \{1\}, \{2\}\}$
      c) $\{\{1\}, \{2\}, \{1, 2\}\}$
      d) $\{\{ \}, \{1\}, \{2\}, \{1, 2\}\}$

3) If A_1, A_2, A_3 form partition of sample space then they are

    a) pairwise independent   b) mutually independent

    c) mutually exclusive   d) none of these

4) If A and B are independent events where $P(A) = 0.6$, $P(A \cap B) = 0.3$ then $P(B) =$

    a) 0.1   b) 0.2

    c) 0.3   d) 0.5

5) Which of the following may be a p. m. f. ?

    a) $P(x) = 2 - x$, $x = 10, 20$ b) $P(x) = \dfrac{x}{15}$ $x = 10, 20$

    c) $P(x) = \dfrac{1}{2}$ $x = 10, 20$ d) $P(x) = \dfrac{x}{25}$ $x = 10, 20$

5. Answer **any five** of the following :   **10**

  i) Define :

    a) Elementary event

    b) Compound event

  ii) Define :

    a) Exhaustive events

    b) Equally likely events

  iii) If A and B are mutually exclusive events prove that $P\left(\dfrac{A}{A \cup B}\right) = \dfrac{P(A)}{P(A) + P(B)}$.

  iv) If A and B are independent then prove that A and $\bar{B}$ are independent.

  v) If $P(A) = 0.4$ $p(B) = 0.3$ $P(A \cap B) = 0.12$. Find $P(A \cup B)$ and $P(A \cap \bar{B})$.

  vi) Define partition of sample space.

  vii) Define probability mass function and distribution function.

6. A) Answer **any two** of the following : **10**

    i) For any events show that

      i) $P(A^c) = 1 - P(A)$

      ii) $0 \leq P(A) \leq 1$

    ii) For any two events A and B prove that

      $P(A \cap B) \leq P(A) \leq P(A \cup B)$

    iii) A box contains 4 tickets marked with numbers 111, 121, 211 and 221. One ticket is drawn from the box at random. Let A_i (i = 1, 2, 3) be the event that the ith digit of the number on ticket drawn is 1. Discuss the independence of events A_1, A_2 and A_3.

  B) Answer **any one** of the following : **10**

    i) Define conditional probability of B given A. Show that it is a probability measure.

    ii) A r. v. X has following distribution :

X :	1	2	3	4	5	6	7
P (x) :	k	2k	3k	k^2	$k^2 + k$	$2k^2$	$4k^2$

      Find :

      i) k

      ii) $P(X > 3)$

      iii) $P(X \leq 4)$

      iv) Distribution function of X

      v) Median of X.

_____

Seat
No.

B.Sc. (Part – I) (Semester – I) (CGPA Pattern) Examination, 2016
ZOOLOGY (Paper – I)
Animal Diversity – I, Cell Biology and Genetics

Day and Date : Monday, 28-3-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

N. B. :   1) **Draw** neat labelled diagrams **wherever** necessary.
              2) Figures to the **right** indicate **full** marks.
              3) **Two** Sections should be written in **same** answerbook.

SECTION – I
(Animal Diversity – I)

1. Rewrite the following sentences choosing correct alternative given below :   **5**

   1) Paramecium belongs to phylum _____

      a) Coelenterata   b) Platyhelminthes

      c) Protista   d) Annelida

   2) In Paramecium contractile vacuoles are _____ in number.

      a) One   b) Three

      c) Four   d) Two

   3) Spicules of Sycon are secreted by _____

      a) Choanocytes   b) Pinacocytes

      c) Porocytes   d) Scleroblasts

   4) _____ is endoparasitic in nature.

      a) Tapeworm   b) Sycon

      c) Hydra   d) Earthworm

   5) In earthworm four pairs of _____ are present.

      a) Testes   b) Spermatheca

      c) Ovaries   d) Nephridia

P.T.O.

2. Answer **any five** of the following : **10**

   i) Salient features of Coelenterata.

   ii) Looping in Hydra.

   iii) Archaeocytes of Sycon.

   iv) Gizzard of earthworm.

   v) Mature proglottid of tapeworm.

   vi) Setae of earthworm.

   vii) Budding in Hydra.

3. A) Write short notes on **any two** of the following : **10**

   i) Describe contractile vacuole in Paramecium.

   ii) Describe sexual reproduction in Hydra.

   iii) Describe septal nephridium of earthworm.

   B) Answer **any one** of the following : **10**

   i) What are adaptations ? Explain morphological and physiological adaptations in tapeworm.

   ii) Describe the nervous system of earthworm.

SECTION – II
(Cell Biology and Genetics)

4. Rewrite the following sentences choosing correct alternative given below : **5**

   1) In incomplete dominance the phenotypic ratio is _____

      a) 3 : 1   b) 1 : 2 : 1   c) 9 : 3 : 3 : 1   d) 9 : 3 : 4

   2) The person with blood group _____ is called universal acceptor.

      a) A   b) B   c) AB   d) O

   3) _____ is called as power house of cell.

      a) Mitochondrion   b) Ribosome

      c) Nucleus   d) Nucleolus

4) _____ mechanism of sex determination in man.

    a) XX – XY type   b) XX – XX type

    c) ZZ – ZW type   d) ZZ – ZZ type

5) _____ is father of genetics.

    a) C. Stern   b) Batson   c) Punnet   d) Mendel

5. Answer **any five** of the following :   **10**

  i) Eukaryotic cell

  ii) Lampbrush chromosome

  iii) Ribosome

  iv) Co-dominance

  v) Monohybrid cross

  vi) Electron microscope

  vii) Nucleolus.

6. A) Write short notes on **any two** of the following :   **10**

  i) Explain Sickle cell anaemia.

  ii) Give structure and function of Golgi-complex.

  iii) Explain structure and functions of Plasma membrane.

  B) Answer **any one** of the following :   **10**

  i) What is mean by multiple allele ? Explain it with reference to coat colour in rabbit.

  ii) Describe dihybrid cross.

_____

Seat No.

**B.Sc. (Part – I) (Semester – I) (CGPA) Examination, 2016
MATHEMATICS
Algebra and Calculus (Paper – I)**

Day and Date : Tuesday, 29-3-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

N.B. : i) **All** questions are **compulsory** .
        ii) *Figures to the* **right** *indicate* **full** *marks.*
        iii) *Answers to the* **two** *Sections should be written in the* **same**
             answerbook.

SECTION – I
(Algebra)

1. Select and write the correct alternative for **each** of the following.   5

    1) Find the skew-symmetric matrix

    a) $\begin{bmatrix} 0 & -3/2 \\ 3/2 & 0 \end{bmatrix}$
    b) $\begin{bmatrix} 0 & 3/2 \\ 3/2 & 0 \end{bmatrix}$
    c) $\begin{bmatrix} 1 & 3/2 \\ -3/2 & 0 \end{bmatrix}$
    d) $\begin{bmatrix} 2 & 3/2 \\ 3/2 & 2 \end{bmatrix}$

    2) The system of equations $2x - y = 0$, $6x - 3y = 0$ have

    a) Unique zero solution   b) Infinite nonzero solutions

    c) No solution   d) None of these

    3) If $z = 1 + i$ then $|z| =$

    a) 2   b) $\sqrt{2}$ c) -2 d) 0

    4) The value of $\cosh(0) =$

    a) -1 b) 0   c) 1   d) none of these

    5) Rank of the matrix $A = \begin{bmatrix} 3 & 6 \\ 4 & 8 \end{bmatrix}$ is

    a) 0   b) 1   c) 2   d) none of these

2. Attempt **any five** of the following : **10**

   1) Find the characteristic equation of the matrix $\begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$.

   2) Show that the equations $x + y = 1$, $2x + 3y = 1$, $5x - y = 11$ are consistent and solve them.

   3) Prove that i^i is a real number.

   4) Prove that $\cos(iz) = \cosh z$, z being complex number.

   5) If A is square matrix, then that $(A + A')$ is a symmetric matrix and $(A - A')$ is a skew-symmetric matrix.

   6) Express $z = 1 + i\sqrt{3}$ to its polar form and find its modulus and argument.

   7) Find all the values of $(1)^{\frac{1}{3}}$.

3. A) Attempt **any two** of the following : **10**

   1) Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 2 & -2 & 2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$.

   2) Show that the system of equations $2x - 2y + z = \lambda x$, $2x - 3y + 2z = \lambda y$, $-x + 2y = \lambda z$ can possess a non-trivial solution if and only if $\lambda = 1$, $\lambda = -3$. Obtain the general solution in each case.

   3) If $\sin(\alpha + i\beta) = x + iy$ then prove that

   i) $\dfrac{x^2}{\cosh^2 \beta} + \dfrac{y^2}{\sinh^2 \beta} = 1$ and

   ii) $\dfrac{x^2}{\sin^2 \alpha} - \dfrac{y^2}{\cos^2 \alpha} = 1$

   B) Attempt **any one** of the following. **10**

   1) Verify Cayley-Hamilton's theorem for the matrix $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 0 & 1 \\ 2 & 1 & -2 \end{bmatrix}$ and hence find A^{-1} and A^4.

2) State and prove De-Moivre's theorem. Hence if n is positive integer show

that $(1+i)^n + (1-i)^n = 2^{\left(\frac{n+2}{2}\right)}.\cos\frac{n\pi}{4}$.

SECTION – II
(Calculus)

4. Select and write the correct alternative for **each** of the following. **5**

1) Find the $\lim\limits_{x\to1}\dfrac{1+\log x - x}{1-2x+x^2}$

   a) $\dfrac{1}{2}$ b) $-\dfrac{1}{2}$ c) $\dfrac{1}{3}$ d) $-\dfrac{1}{3}$

2) If $u = x^3 - 3xy^2$ and $v = 3x^2y - y^3$ then $\dfrac{\partial u}{\partial y}+\dfrac{\partial v}{\partial x}=$

   a) 0   b) –1   c) 1   d) 2

3) Value of $\int\limits_{0}^{\pi/2}\sin^5 x\, dx =$

   a) $\dfrac{1}{15}$ b) $\dfrac{8}{15}$ c) $\dfrac{4\pi}{15}$ d) $\dfrac{7}{15}$

4) If $\phi = x^2 i + y^2 j + z^2 k$ then at $(1, -1, -2)$ the value of grad $\phi =$

   a) $i + j + k$ b) $i - j - 2k$ c) $2i - 2j - 4k$ d) $2i + 2j + 4k$

5) If $u = \dfrac{x^{1/4}+y^{1/4}}{x^{1/5}+y^{1/5}}$ and it is homogeneous then its degree =

   a) $\dfrac{1}{20}$ b) $\dfrac{1}{4}$ c) $\dfrac{1}{5}$ d) none of these

5. Attempt **any five** of the following : **10**

1) Evaluate $\lim\limits_{x \to 0}$ x.log (tanx).

2) If $y = \dfrac{x}{x^2 - a^2}$ then find y_n.

3) Obtain the series expansion of cosx.

4) Discuss the continuity of the function f(x, y) at (0, 0)

$$f(x, y) = \dfrac{x^2 y^2}{x^2 y^2 + (x - y)^2} \; , \; (x, y) \neq (0, 0) \quad f(0, 0) = 0$$

5) Find $\displaystyle\int\limits_{0}^{1} \dfrac{x^6}{\sqrt{1 - x^2}} \, dx$.

6) If $\vec{f} = x^2 z \hat{i} - 2y^3 z^2 \hat{j} + xzy^2 \hat{k}$ then find div $\vec{f}$ and curl $\vec{f}$ at (1, –1, 1).

7) If $z = e^{xy^2}$, x = t cost, y = t sint find $\dfrac{dz}{dt}$ at $t = \dfrac{\pi}{2}$.

6. A) Attempt **any two** of the following : **10**

1) If z = f(x, y) and x = r cos θ, y = r sin θ then prove that

$$\left(\dfrac{\partial z}{\partial x}\right)^2 + \left(\dfrac{\partial z}{\partial y}\right)^2 = \left(\dfrac{\partial z}{\partial r}\right)^2 + \dfrac{1}{r^2}\left(\dfrac{\partial z}{\partial \theta}\right)^2 .$$

2) Evaluate $\displaystyle\int\limits_{0}^{\infty} \dfrac{x^2}{(a^2 + x^2)^4} \, dx$.

3) Prove that $\nabla^2 (\log r) = \dfrac{1}{r^2}$.

B) Attempt **any one** of the following. **10**

1) State and prove Leibnitz's theorem and hence if $y = \dfrac{\sin^{-1} x}{\sqrt{1 - x^2}}$ then prove that

$(1 - x^2)y_{n+1} - (2n + 1)y_n x - n^2 y_{n-1} = 0$.

2) State and prove Euler's theorem on homogeneous function of nth degree.

Hence if $u = \tan^{-1}\left(\dfrac{x^3 - y^3}{x + y}\right)$ then prove that $x \dfrac{\partial u}{\partial x} + y \dfrac{\partial u}{\partial y} = \sin 2u$.

Seat No.

B.Sc. – I (Semester – I) (CGPA Pattern) Examination, 2016
BOTANY (Paper – I)
Microbiology and Cryptogams, Plant Physiology and Horticulture

Day and Date : Tuesday, 29-3-2016   Max. Marks : 70

Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Draw **neat** labelled diagrams **wherever** necessary.
3) Figures to the **right** indicate **full** marks.

SECTION – I
(**Microbiology and Cryptogams**)

1. Rewrite the following sentences by choosing correct alternatives :   **5**

    1) The shape of coccus bacterium is

    a) Spherical   b) Rod like

    c) Spiral   d) Filamentous

    2) Spirogyra is a _____ alga.

    a) Sea water   b) Fresh water

    c) Terrestrial   d) None of these

    3) Mode of nutrition in Mucor is

    a) Autotrophic   b) Symbiotic

    c) Saprophytic   d) Both a) and b)

    4) _____ moss is used as surgical dressings.

    a) Nostoc   b) Riccia

    c) Anthoceros   d) Sphagnum

    5) Ligulate leaves are found in

    a) Selaginella   b) Spirogyra

    c) Nostoc   d) Riccia

P.T.O.

2. Answer **any five** of the following : **10**

   i) What is virus ?

   ii) Sketch and label the cell structure of <u>Spirogyra</u>.

   iii) Write long form of PPLO and MLO.

   iv) Give systematic position of <u>Albugo</u>.

   v) What is lichen ? Mention the types of lichens.

   vi) Give economic importance of algae (any four).

   vii) Give the functions of heterocysts in <u>Nostoc</u>.

3. A) Write short notes on **any two** of the following : **10**

   i) Economic importance of bryophytes.

   ii) General character of mycoplasma.

   iii) Describe scalariform conjugation in <u>Spirogyra</u>.

  B) Answer **any one** of the following : **10**

   i) Describe asexual and sexual reproduction in <u>Albugo</u>.

   ii) Describe the anatomy (T.S.) of stem and L.S. of strobilus in <u>Selaginella</u>.

SECTION – II
(**Plant Physiology and Horticulture**)

1. Rewrite the following sentences by choosing correct alternatives : **5**

   1) The branch of horticulture which deals with cultivation, processing and marketing of vegetables is called

     a) Pomiculture   b) Olericulture

     c) Floriculture   d) Ornamental

   2) Floribunda is a variety of

     a) Rose   b) Marigold

     c) Tagets   d) Gerbera

   3) _____ is a microelement.

     a) N   b) P

     c) Cu   d) Ca

4) _____ is a Day Nutral Plant (DNP).

   a) Sunflower   b) Maize

   c) Wheet   d) Rice

5) In holoenzyme, the protein part is called

   a) Apoenzyme   b) Prosthetic group

   c) Co-enzyme   d) Co-factor

2. Answer **any five** of the following :   **10**

  i) Define growth.

  ii) What is meant by co-enzyme ?

  iii) What is vernalization ?

  iv) Enlist any two roles of nitrogen.

  v) What is meant by floriculture ?

  vi) Enlist the types of roses.

  vii) Define budding.

3. A) Write short notes on **any two** of the following :   **10**

  i) Describe the various phases of growth.

  ii) Explain whip grafting with suitable example.

  iii) Write a note on branches of horticulture.

B) Answer **any one** of the following :   **10**

  i) Define enzyme, add a note on mechanism of enzyme action.

  ii) What is vegetative propagation ? Explain any four methods of natural propagation.

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Seat No.

B.Sc. – I (Semester – I) (C.G.P.A. Pattern) Examination, 2016
ELECTRONICS (Paper – I)
Electronics Fundamentals and Digital Fundamentals

Day and Date : Wednesday, 30-3-2016　　　　　　Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　2) Figures to the **right** indicate **full** marks.
　　　　　　　3) Draw **neat** labelled diagrams **wherever** necessary.
　　　　　　　4) **Use** of log table and calculator is **allowed**.

SECTION – I

(Electronics Fundamentals)

1. Select the correct alternative for the following :　　　　　　5

    i) The unit of inductance is

    a) ohm　　　　b) mhos　　　　c) Farad　　　d) Henry

    ii) Parallel resonance circuit is also known as

    a) Acceptor circuit　　　　　　　b) Rejector circuit

    c) Both a and b　　　　　　　　d) None of these

    iii) Kirchoff's current law is conservation of

    a) current　　　b) charge　　　c) voltage　　　d) power

    iv) A super position theorem is applied to a network containing

    a) One current source　　　　　b) One voltage source

    c) More than one energy source　　d) Without energy source

    v) A sine wave has period of 5 m.s. the frequency is

    a) 200 Hz　　　b) 2 Hz　　　c) 20 Hz　　　d) 0.2 KHz

2. Answer **any 5** for the following :   **10**

    i) Define quality factor and selectivity.

    ii) State Thevenin's theorem.

    iii) Define node and network.

    iv) Calculate equivalent capacity of a capacitor of each capacity 10 μF are connected in series.

    v) Define I and II network.

    vi) Define h-parameters and give their formulaes.

    vii) Write the colour code of 1MΩ carbon composition resistance.

3. A) Write short notes on **any two** of the following :   **10**
      i) Constant current and voltage source.
      ii) Fuse
      iii) Mash-Analysis

   B) Answer **any one** of the following :   **10**
      i) Explain LCR series resonance circuit. Derive the expression for resonance frequency and quality factor.
      ii) Obtain z-parameters for two port network.

SECTION – II

(Digital Fundamentals)

1. Select correct alternative for the following :   **5**

    i) Hexadecimal number B is equivalent binary number is

     a) 1010   b) 1011   c) 1110   d) 1101

    ii) Gray code of 1011 is

     a) 1110   b) 1010   c) 1100   d) 1101

    iii) The IC 7404 is a gate of

     a) AND   b) OR   c) NOT   d) XOR

iv) Which gate is called universal gate ?

    a) NAND   b) NOR

    c) Both a and b   d) None of these

v) Full adder adds number of bits at a time

    a) 1   b) 2   c) 3   d) 4

2. Answer **any five** of the following :   **10**

  i) Draw logic diagram for logic equation $Y = \overline{A} + \overline{B}.C$.

  ii) Draw pinout diagram of IC 7432.

  iii) State AND laws.

  iv) Covert the decimal number $(25)_{10}$ $\overline{m}$ to its equivalent binary number.

  v) What is negative logic ?

  vi) Draw logic diagram for half adder.

  vii) $A.\left(\overline{A} + B\right) = AB$. Simplify using laws of Boolean algebra.

3. A) Write short notes on **any two** of the following :   **10**
    i) Full adder
    ii) Demorgan's theorem
    iii) NOR as a universal gate.

  B) Answer **any one** of the following :   **10**
    i) Explain parallel binary adder.
    ii) Explain with Block diagram digital computer and its organization.

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Seat No.

B.Sc. (Part – I) (Semester – I) (CGPA Pattern) Examination, 2016
PSYCHOLOGY (Paper – I)
General Psychology and Human Development

Day and Date : Wednesday, 30-3-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions :   1) **All** questions are **compulsory**.
                          2) Figures to the **right** indicate **full** marks.

SECTION – I

(General Psychology)

1. Choose the correct alternative :   **5**

   i) Thyroid glands produce the _____ hormones.

      A) Cortin   B) Thyroxin

      C) Adrenalin   D) Oxygen

   ii) The _____ step in understanding anything is to give it a name description.

      A) First   B) Second   C) Sixth   D) Fourth

   iii) _____ refer to all the internal, covert activity of our mind.

      A) Mental process   B) Society

      C) Psychology   D) Prediction

   iv) Skinner developed _____ conditioning theory.

      A) Operant   B) Classical

      C) Experimental   D) Case study

   v) The types of sleeps given by _____

      A) Dement   B) Spindle   C) Wundt   D) Maslow

P.T.O.

2. Answer the following **(any five)** :   **10**

   1) What are the principles of All-or-None ?

   2) What is the prediction ?

   3) How many types of Psychological Goals ?

   4) Who proposed the Psychoanalysis ?

   5) Who proposed the behaviorism ?

   6) What is pituitary gland ?

3. Write the short note **(any two)** :   **10**

   1) Psychoanalysis Perspective

   2) Humanistic Perspective

   3) Role of EAR.

4. A) Explain the nervous system.   **10**

                           OR

   B) Discuss on types of Psychological Professionals.

SECTION – II

(Human Development)

1. Fill in the blanks (Multiple choice) :   **5**

   1) Adolescence is generally considered to began or about _____ and
      end in the late teen or early twenties.

      a) 12 or 13   b) 11 or 12   c) 13 or 14   d) Any other

   2) Adolescents speed their lot of time with _____

      a) Peer's   b) Mother   c) Father   d) Grand Father

   3) The heterosexually is a love of the member of _____ sex.

      a) Opposite   b) No

      c) One own sex   d) One's self

4) _____ glands located on either side of the vagina.

    a) Bartholin's   b) Cervix   c) Hymen   d) Others

5) Alcohol Marijuna and tobacco are the three drugs most popular with _____

    a) Adolescence   b) Middle age   c) Any other   d) Old age

2. Write the answer of the following **(any five)** :   **10**

   1) Define adolescence.

   2) What is the main function of pituitary state ?

   3) What are the Seven Forms of Love ?

   4) Define the cholesterol.

   5) What is the anorexia nervosa ?

   6) What is human development ?

3. Write short notes **(any two)** :   **10**

   1) Perry's Approach

   2) Depression and suicide in adolescence

   3) Passionate and Companionate Love.

4. Answer **any one** of the following :   **10**

   A) Explain the stages of sexuality in adolescence.

           OR

   B) Explain the function of peer group in adolescence.

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SLR-W – 12

B.Sc. – I (Semester – I) (CGPA) Examination, 2016
GEOLOGY
Paper – I : Mineralogy and Palaeontology and Igneous, Sedimentary and Metamorphic Petrology

Day and Date : Wednesday, 30-03-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** labelled diagrams **wherever** necessary.

SECTION – I

(Mineralogy and Palaeontology)

1. Fill in the blanks with correct answer from given options :   **5**

   1) Luster of diamond is
      a) Pearly   b) Silky   c) Admantine   d) Vitreous

   2) Mineral calcite shows presence of _____ sets of cleavages.
      a) One   b) Two   c) Three   d) Many

   3) Pecten belongs to _____ Class.
      a) Lamellibranchia   b) Cephalopoda
      c) Trilobita   d) Echinoidea

   4) The exoskeleton of phylum mollusca, made up of hard, secreted, calcareous material is called as
      a) Hinge   b) Umbo   c) Shell   d) Lunule

   5) The colour of powder of the mineral obtained by scratching it on porcelain plate is called as
      a) Luster   b) Streak   c) Fracture   d) Cleavage

P.T.O.

2. Answer **any five** of the following : **10**

   1) Define mineral.

   2) Describe physical properties and chemical composition of Muscovite and Biotite Minerals.

   3) State the conditions of preservation of fossils.

   4) Draw figure of co-valent bonding in minerals.

   5) Give any two uses of fossils.

   6) Give the names of any two species of cephalopod.

   7) Define fossil.

3. A) Write short notes on **any two** of the following : **10**

     1) Thorax and head of trilobite

     2) Moh's scale of hardness

     3) Amphibole group minerals.

  B) Answer **any one** of the following : **10**

     1) Describe different modes of preservation of fossils.

     2) Describe feldspar group minerals with their physical properties, chemical composition and occurrence.

SECTION – II

(Igneous, Sedimentary and Metamorphic Petrology)

1. Fill in the blanks with correct answer from given options : **5**

   1) The solidification of lava forms _____ Igneous rocks.

     a) Intrusive   b) Extrusive   c) Injected   d) None of these

   2) The bun shaped igneous intrusion in unfolded region is called

     a) Lopolith   b) Phacolith   c) Laccolith   d) Sill

   3) _____ is the abundant element in magma.

     a) Copper   b) Nickel   c) Carbon   d) None of these

   4) The _____ rocks are the insoluble products of rock weathering.

     a) Rudaceous   b) Arenaceous   c) Argillaceous   d) Residual

   5) The directed pressure plays predominant role in _____ metamorphic rocks.

     a) Dynamothermal b) Thermal   c) Contact   d) Cataclastic

2. Answer **any five** of the following : **10**

    1) Define pyrogenetic mineral.

    2) What is magma and lava ?

    3) Laterite formation.

    4) Differentiate between Shale and Claystone.

    5) Schistose structure.

    6) Formation of marble.

    7) Vesicular structure.

3. A) Answer **any two** of the following : **10**

    1) Explain Discordant igneous intrusions.

    2) Explain graded bedding and rain prints.

    3) Explain depth zones.

  B) Answer **any one** of the following : **10**

    1) Explain in detail "Rock Cycle".

    2) Explain Cross bedding, Ripple marks, Mud cracks and Pisolitic Structure.

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Seat
No.

B.Sc. I (Semester – I) (CGPA) Examination, 2016
MICROBIOLOGY (Paper – I)
Fundamentals of Microbiology and Microbial Techniques

Day and Date : Wednesday, 30-3-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

N.B. : 1) **All** questions are **compulsory**.
          2) Figures to the **right** indicates **full** marks.

SECTION – I

(Fundamentals of Microbiology)

1. Rewrite the following sentences by selecting correct answers from given
   alternatives.   **5**

   1) Major component of cell wall of Gram Positive bacteria is _____

      a) Phospholipid   b) Polysaccharide

      c) Peptidoglycan   d) Lipid

   2) Actinomycetes is link between bacteria and _____

      a) Viruses   b) Fungi   c) Algae   d) Protozoa

   3) Mesosomes are invaginations of _____

      a) Cell membrane   b) Cell wall

      c) Ribosome   d) Flagella

   4) Rabies vaccine was developed by _____

      a) Louis Pasteur   b) Joseph Lister

      c) Alexander Flemming   d) Ed. Jenner

   5) Study of fungi is called _____

      a) Anatomy   b) Morphology   c) Mycology   d) Cytology

2. Answer **any five** of the following.   **10**

   i) Contributions of Alexander Flemming.

   ii) Define virology.

   iii) Define Taxonomy.

   iv) Functions of Ribosomes.

   v) Morphological types of bacteria.

   vi) Contribution of John Tyndall.

   vii) Define endospore.

3. A) Write short notes on **any two** of the following.   **10**

   i) Structure and functions of flagella.

   ii) General characteristics of Actinomycetes.

   iii) Difference between procaryotic and eucaryotic cell.

  B) Answer **any one** of the following.   **10**

   i) Discuss in detail general characteristics and cultivation of fungi.

   ii) With neat labelled diagram describe the different parts of bacterial cell.

<div align="center">

SECTION – II

(Microbial Techniques)

</div>

1. Rewrite the following sentences by selecting correct answers from given
  alternatives.   **5**

  1) _____ is used for gaseous sterilization.

    a) Alcohol   b) Lysol   c) Phenol   d) Ethylene oxide

  2) For capsule staining _____ method is used.

    a) Chance's   b) Albert's   c) Maneral's   d) Gram's

  3) Refractive index of cedar wood oil is _____

    a) 1   b) 1.5   c) 2.5   d) 0.5

4) _____ is selective medium for coliforms.

    a) Nutrient agar   b) Blood agar

    c) MacConkey's agar   d) Sabouraud's agar

5) Effective germicidal wavelength of U.V. rays is

    a) 2650 A°   b) 250 A°   c) 1550 A°   d) 650 A°

2. Answer **any five** of the following.   **10**

  i) Define basic Stains.

  ii) Define Natural Media.

  iii) Types of objective lenses.

  iv) Define disinfection.

  v) Stains used in capsule staining.

  vi) List of gaseous sterilizing agents.

  vii) Examples of living media.

3. A) Write short notes on **any two** of the following.   **10**

    i) Compound Microscope

    ii) Cell wall staining

    iii) Autoclave.

  B) Answer **any one** of the following.   **10**

    i) Define sterilization and describe in detail sterilization by chemical agents.

    ii) Define differential staining and describe in detail Gram Staining.

_____

Seat No.	

B.Sc. – I (Semester – II) (CGPA Pattern) Examination, 2016
ENGLISH COMPULSORY
On Track : English Skills for Success

Day and Date : Thursday, 31-3-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

N.B. :   1) **All** questions are **compulsory**.
        2) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences by choosing correct alternative given below **each** :   **14**

   1) The Parliament of Religions was to be held in _____

     a) America   b) Singapore

     c) Canada   d) South Africa

   2) _____ is not passed by Swami Vivekananda travelling to America.

     a) Ceylon   b) Singapore

     c) Penang   d) Australia

   3) Jain was represented by _____

     a) Vivekananda   b) Chakravarthi

     c) Gandhi   d) Annie Besant

   4) 'The world's most dangerous animal.' Inside the cage there is no animal but a _____

     a) Nothing   b) Man   c) Mirror   d) None

   5) The main reason of the serious economics problems of the majority is _____

     a) Famine   b) Negligence

     c) Ignorance   d) All

   6) Wernher Von Braun was _____ scientist who produced Jupiter missile.

     a) an American   b) a Russian

     c) a Roman   d) a German

7) Brahma is a _____ Deity.

   a) Hindu   b) German   c) American   d) Japanese

8) The poem 'Full Moon' is written by _____

   a) Kamala Das   b) Robert Hayden

   c) Nani Palkhivala   d) Toru Dutta

9) Today the moon is merely an attraction for _____

   a) the poets   b) the children

   c) the scientists   d) the lovers

10) Keats takes apostrophe _____

   a) Keats'   b) Keat's   c) Keats's   d) All

11) She took _____ laptop. (belong to Gita)

   a) Gitas'   b) Gita's   c) Both   d) None

12) Pune is _____ to my village than Nagpur.

   a) big   b) bigger   c) biggest   d) all

13) Die and dye are the examples of _____

   a) Homonyms   b) Homophones

   c) Homographs   d) Synonym

14) _____ is the antonym of literate.

   a) Illiterate   b) Semiliterate

   c) Aliterate   d) Hyperliterate

2. Answer **any seven** of the following questions in **two** or **three** sentences :   **14**

   1) What is Dr. Kalam's opinion of Wernher von Braun ?

   2) What had Dr. Kalam tested successfully in France ?

   3) When did Swami Vivekananda Left Bombay for ?

   4) What is human rights summed up ?

   5) What are the primary ideas of human rights ?

6) Who were the Indians to represent various religions ?

7) Who wrote 'Brahma' ?

8) Which poem refers the garden of Gethsemane ?

3. A) Write short answers on **any two** of the following : **8**

1) What do you learn of Dr. Kalam's dedication to team work through the essay "work brings solace" ?

2) What is the history of human rights in the world ?

3) Describe the appearance of Swami Vivekananda.

B) Answer **any two** of the following briefly : **6**

1) What is an agenda ?

2) What is CC ?

3) What should be avoided in C.V. ?

4. Write a suitable C.V. for the post of secondary school teacher. **14**

OR

Write a notice, agenda and minutes for college gathering meeting.

5. Write an e-mail application letter for an accountant. **14**

_____

SLR-W – 15

Seat No.	

B.Sc. I (Semester – II) Examination, 2016
CHEMISTRY (Paper – II) (CGPA Pattern)
Organic and Analytical Chemistry

Day and Date : Friday, 1-4-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions : 1) ***All*** questions are ***compulsory***.
2) Draw ***neat*** diagrams and give equations ***wherever*** necessary.
3) Figures to the ***right*** indicate ***full*** marks.
4) Use of logarithmic table and calculator is ***allowed***.
(Atomic weights : H = 1, C = 12, O = 16, N = 14, Na = 23, Cl = 35.5)

SECTION – I
(Organic Chemistry)

1. Select the correct alternative for each of the following and rewrite sentences: **5**

    i) Electrophiles are _____ species.
       a) electron loving
       b) nucleus loving
       c) nucleus hating
       d) none of these

    ii) Maleic and fumaric acids are _____
       a) optical isomers
       b) geometrical isomers
       c) conformational isomers
       d) enantiomers

    iii) The reaction $C_6H_6 + CH_3 - \overset{O}{\overset{\|}{C}} - Cl \xrightarrow[\text{anhydrous}]{AlCl_3} C_6H_5 - \overset{O}{\overset{\|}{C}} - CH_3 + HCl$ is an

       example of _____
       a) Grignard reaction
       b) Wurtz reaction
       c) Friedel-Crafts reaction
       d) Kolbe's reaction

P.T.O.

iv) Acidic hydrogens are present in _____

  a) benzene   b) ethane

  c) ethene   d) ethyne

v) Hyper conjugation effect involves the delocalization of _____

  a) σ electrons   b) π electrons

  c) σ and π electrons   d) lone pair of electrons

2. Answer **any five** of the following :   **10**

  i) What is the meaning of curved arrow and half headed arrow ?

  ii) Define :

   a) Homolytic bond fission.

   b) Heterolytic bond fission.

  iii) Define :

   a) Enantiomers

   b) Diastereoisomers.

  iv) Predict the product of following :

$$H_3C- \underset{\underset{\overset{|}{CH_3}}{Cu}}{} -Li+CH_3-CH_2-CH_2-Br \rightarrow ?$$

  v) Complete the following reaction.

   ⬡ + con. HNO_3 $\xrightarrow[50-60°C]{Con.\,H_2SO_4}$?
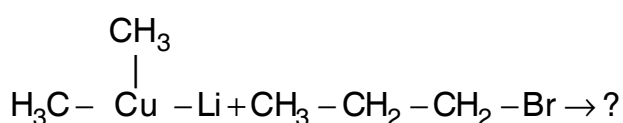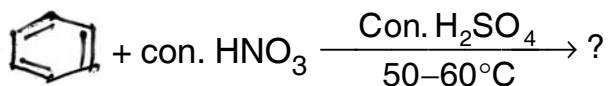
  vi) Explain Pseudo aromatic compounds.

  vii) What is Huckel's rule of aromaticity ? Explain it with respect to pyrrole.

3. A) Write short note on **any two** of the following : 10

   i) Substitution reactions.

   ii) Optical isomerism in tartaric acid.

   iii) Halogenation of methane.

   B) Answer **any one** of the following : 10

   i) What are dienes ? Describe different types of dienes with suitable examples. Discuss any two methods of preparation of 1, 3- butadiene.

   ii) What is hybridisation ? Explain the formation of CH_4 and C_2H_4 on the basis of hybridisation.

SECTION – II
(Analytical Chemistry)

4. Select the most correct alternative for the following and rewrite the sentences: 5

   i) The liquids with high coefficients of viscosity is said to be _____ liquids.

   a) mobile   b) viscous   c) ideal   d) non ideal

   ii) In Lassaigne's test, an organic compound is fused with ___

   a) CuO   b) $CuSO_4$ c) Na   d) $FeSO_4$

   iii) Sodium carbonate react with gastric acid to form _____ chloride.

   a) Potassium   b) Aluminium   c) Ferric   d) Sodium

   iv) Aluminium is economically extracted from _____ ore.

   a) bauxite   b) haematite

   c) dolomite   d) pyrolusite

   v) Smoke is _____ air pollutant.

   a) Organic gases   b) Inorganic gases

   c) Aerosols   d) Particulate

5. Answer **any five** of the following : **10**

   i) What are common methods for adulteration of milk ?

   ii) Explain the importance of cis-platin.

   iii) State Nernst distribution law.

   iv) Define the terms :

     a) Minerals

     b) Flux.

   v) Draw a neat and labelled diagram of blast furnace.

   vi) What are the sources of oxides of nitrogen ?

   vii) Explain health effect of oxides of sulphur.

6. A) Write short notes on **any two** of the following : **10**

   i) Electrodialysis.

   ii) Distribution indicators.

   iii) Magnetic separation.

  B) Answer **any one** of the following : **10**

   i) State the Macleod's equation. How it is modified to get Sugden's equation ?

   ii) Describe the Liebig's method for estimation of carbon and hydrogen in an organic compound. 1.8×10^{-4} kg of an organic compound when subjected to combustion method produced 1.08×10^{-4} kg of water and 2.64×10^{-4} kg of carbon dioxide. Determine percentage of hydrogen and carbon in the compound.

_____

SLR-W – 16

B.Sc. (Computer Science) – I (Semester – II) (CGPA Pattern) Examination, 2016
COMPUTER FUNDAMENTALS AND PROGRAMMING USING 'C' – II
(Paper – II)

Day and Date : Friday, 1-4-2016 Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

N. B. : 1) **All** questions are **compulsory**.
2) Figures to the **right place** indicate **full** marks.

SECTION – I
(Computer Fundamentals)

1. Multiple choice questions : **5**

   i) URL means _____
      a) Universal Resource Locator
      b) Uniform Resource Locator
      c) Unity Resource Locator
      d) None of these

   ii) _____ is interleaved execution of two or more different and independent programs by a computer.
      a) Multiprogramming b) Multiprocessing
      c) Multitasking d) Multithreading

   iii) A _____ is a collection of related information.
      a) Icon b) Folder
      c) File d) Drive

   iv) _____ keyword is used to declare variable in javascript.
      a) declare b) var
      c) dim d) none of these

   v) _____ function is used to written positive integer value.
      a) int b) positive
      c) abs d) none of these

P.T.O.

2. Answer **any five** of the following : **10**
    i) Give the types of CSS.
    ii) Give the list of data types in vbscript.
    iii) Give the features of operating system.
    iv) List the types of networking.
    v) Difference between "Downloading" and "Uploading" of information.
    vi) Give disadvantages of Internet.
    vii) What is GUI ?

3. A) Write short notes on **any two** of the following : **10**
    i) Write a program in javascript to find out given number is prime or not.
    ii) Explain difference between HTML and DHTML.
    iii) What is operating system ? Explain types of operating system.

   B) Answer **any one** of the following : **10**
    i) Explain process management in detail.
    ii) What is hyperlink ? Explain internal and external hyperlink with example.

SECTION – II
(Programming Using 'C' – II)

1. Choose correct alternatives : **5**
    1) The default value of auto variable is _____
       a) Zero   b) One   c) Garbage   d) None of these
    2) What is the output :
       # define SQR(X) X*X
       void main ()
       {
       printf("\n%d",SQR(5+2));
       }
       a) Error   b) 25   c) 49   d) 17
    3) We can handle may members at a time using structure.
       a) True   b) False
    4) The command line argument accept _____ number of parameters.
       a) 1   b) 2   c) 3   d) 0
    5) The macro accepts arguments.
       a) True   b) False

2. Answer **any five** of the following : **10**

   1) What is difference between macro and function ?

   2) What is difference between call by value and call by address ?

   3) What is pointer to pointer ?

   4) What is difference between structure and union ?

   5) Give the syntax for creating text file.

   6) Why sizeof() is used ?

   7) Give the syntax of putch() and putche().

3. A) Solve **any two** of the following : **10**

   1) Write a program to find out given number is even or odd using complier control macros.

   2) Explain the nested function with example.

   3) Explain how to create file with example.

  B) Solve **any one** of the following : **10**

   1) How to pass structure as an argument to function ? Write a program to pass whole structure to function.

   2) Explain dynamic memory allocation with example.

SLR-W – 17

B.Sc. – I (Semester – II) (CGPA Pattern) Examination, 2016
PHYSICS (Paper – II)
Heat and Thermodynamics, Electricity, Magnetism and Basic Electronics

Day and Date : Saturday, 2-4-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

N.B. : 1) *All* questions are *compulsory*.
        2) Figures to the *right* indicate *full* marks.
        3) Draw *neat* diagrams *wherever* necessary.
        4) *Use* of logarithmic table is *allowed*.

SECTION – I

(Heat and Thermodynamics)

1. Select correct alternative :   **5**

   i) Clausius expression for mean free path is

     a) $\lambda = \dfrac{1}{\pi\sigma^2 n}$ b) $\lambda = \dfrac{3}{4\pi\sigma^2 n}$

     c) $\lambda = \dfrac{4}{3\pi\sigma^2 n}$ d) $\lambda = \dfrac{1}{\sqrt{2}\,\pi\sigma^2 n}$

   ii) Coefficient of thermal conductivity of any gas
     a) increases with increase of temperature
     b) decreases with increase of temperature
     c) remains constant with increase in temperature
     d) reduces to zero with increase in temperature

   iii) During irreversible process ; entropy
     a) decreases   b) increases
     c) remains constant   d) none of the above

P.T.O.

iv) Coefficient of performance of refrigerator working between temperature 300°K and 400°K is

a) 1   b) 2   c) 3   d) 4

v) Efficiency of heat engine is always

a) less than one   b) negative

c) greater than one   d) all of the above

2. Answer **any five** of the following :   **10**

i) Define isothermal change.

ii) Give the comparison between otto engine and diesel engine.

iii) Give the principle of air conditioning.

iv) Define free path and mean free path.

v) What is magnetocaloric effect ?

vi) Give the examples of irreversible process.

vii) Calculate the coefficient of performance of refrigerator machine working between the temperatures – 15°c and 30°c.

3. A) Answer **any two** of the following :   **10**

i) Obtain adiabatic relation pv^r = constant.

ii) Obtain an expression for coefficient of viscosity on the basis of transport phenomena.

iii) Explain the working of Linde's air liquefier.

B) Answer **any one** of the following :   **10**

i) Describe the working of diesel engine and obtain an expression for its efficiency.

ii) Describe vapour compression refrigerator and obtain an expression for its coefficient of performance.

SECTION – II

(Electricity, Magnetism and Basic Electronics)

1. Select correct alternative : **5**

   i) In parallel resonance LCR circuit, the resonance frequency is given by

   a) $f_r = \dfrac{1}{2\pi\sqrt{LC}}$

   b) $f_r = \dfrac{1}{2\pi}\sqrt{\dfrac{X_L - X_C}{R}}$

   c) $f_r = \dfrac{1}{2\pi LC}$

   d) $f_r = \dfrac{1}{2\pi}\sqrt{\dfrac{1}{LC} - \dfrac{R^2}{C^2}}$

   ii) _____ circuit converts the G.C. into pulsating d.c.

   a) Transistor

   b) Transmitter

   c) Rectifier

   d) LCR circuit

   iii) In transistor _____ region is heavily doped.

   a) emitter   b) base   c) collector   d) all the above

   iv) In common emitter configuration the current amplification factor β is

   a) $\beta = \dfrac{\Delta I_B}{\Delta I_C}$

   b) $\beta = \dfrac{\Delta I_C}{\Delta I_E}$

   c) $\beta = \dfrac{\Delta I_C}{\Delta I_B}$

   d) $\beta = \dfrac{\Delta I_E}{\Delta I_B}$

   v) In the process of charging of condensor through resistance in the d.c. circuit containing resistance and capacitor, the instantaneous current equation have the form

   a) $i = i_0\,\dfrac{-t}{e^{RC}}$

   b) $i = -i_0\,\dfrac{-t}{e^{RC}}$

   c) $i = i_0\left(1 - e^{\frac{-t}{RC}}\right)$

   d) $i = i_0\left(1 - e^{\frac{t}{RC}}\right)$

2. Answer **any five** of the following : **10**

   i) Define the term impedance and reactance.

   ii) Calculate the current amplification factor of CE configuration if current amplification factor for CB configuration is 0.99.

iii) What is clamper ? Draw the circuit diagram for positive clamper.

iv) What is the significance of time constant is LR circuit ?

 v) Define the Q-factor for series LCR circuit.

vi) State Biot and Savart law.

vii) Define ripple factor.

3. A) Answer **any two** of the following : **10**

   i) Explain with neat circuit diagram, working of transistor as common base amplifier.

   ii) Describe Own's bridge.

   iii) Write a note on π filter.

 B) Answer **any one** of the following : **10**

   i) Derive an expression for growth and decay of current in LR circuit.

   ii) Draw neat labelled diagram of moving coil galvanometer and write its construction and working.

_____

Seat No.

B.Sc. (Part – I) (Semester – II) (CGPA Pattern) Examination, 2016
PHYSICAL GEOGRAPHY (Paper – II)
Climatology

Day and Date : Saturday, 2-4-2016

Time : 2.30 p.m. to 5.00 p.m.   Max. Marks : 70

Instructions : 1) *All* questions are *compulsory*.
2) *Neat* diagrams must be drawn *wherever* necessary.
3) Use of map stencils is *allowed*.
4) Figures to the *right* indicate *full* marks.

SECTION – I

1. Complete the following sentences by choosing correct alternatives.   **5**

   1) An average atmospheric condition for a long period of time in a particular, is called
      a) Climate   b) Weather   c) Atmosphere   d) None of them

   2) _____ gas absorbs the ultraviolet rays from the incoming solar radiation.
      a) Nitrogen   b) Oxygen   c) Ozone   d) Argon

   3) At 40° South latitudes, Westerlies blows without disturbance with greater velocities known as
      a) Roaring forties   b) Furious fifties
      c) Shrienking sixties   d) None of them

   4) The proportion of oxygen gas in the atmosphere is _____ % by volume.
      a) 78.08   b) 20.94   c) 0.03   d) Trace

   5) _____ is the lowest layer of atmosphere.
      a) Troposphere   b) Stratosphere
      c) Mesosphere   d) Exosphere

P.T.O.

2. Answer **any five** questions from the following : **10**

   i) State the importance of oxygen in the atmosphere.

   ii) Give the name of climatic zones on earth.

   iii) Define isobars.

   iv) Explain the land breezes.

   v) Explain ozonosphere.

   vi) Explain doldrum belt on earth.

   vii) State the various layers of atmosphere.

3. A) Write a short notes on **any two** of the following : **10**

   i) Importance of water vapour in the atmosphere.

   ii) Classification of planetary winds.

   iii) Heat budget of earth.

   B) Answer **any one** of the following : **10**

   i) Describe the air pressure belts on the earth with neat diagram.

   ii) Define climatology and state its scope and importance in all fields.

SECTION – II

1. Complete the following sentences by choosing correct alternatives. **5**

   1) North pole is surrounded by _____ ocean.
      a) Indian   b) Atlantic   c) Arctic   d) Pacific

   2) Oceanography is the branch of _____ geography.
      a) Physical   b) Human   c) Economic   d) Agricultural

   3) The average salinity of seas and oceans are _____ %.
      a) 15   b) 35   c) 70   d) 34

   4) Littoral ocean deposits found on _____ in between high and low tide line.
      a) Continental shelves   b) Continental slope
      c) Abyssal plain   d) Ocean deeps

   5) Non subsidence theory of coral formation postulated by
      a) R.A. Daly   b) Charles Darwin   c) Murray   d) W.M. Davis

2. Answer **any five** questions from the following : **10**

   i) Explain the types of tides.

   ii) Explain the barrier reefs.

   iii) Give the name of warm current in the world.

   iv) State the latitudinal oceanic temperature in the world.

   v) Classify the palegic deposits.

   vi) Define oceanography.

   vii) Define coral reefs.

3. A) Write short notes on **any two** of the following : **10**

   i) Factors affecting on the oceanic temperature.

   ii) Formation process of fringing reefs.

   iii) Surface configuration of ocean bottom.

  B) Answer **any one** of the following : **10**

   i) Describe the ocean currents in Atlantic ocean.

   ii) What is meant by tides ? Classify it with schematic diagram.

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Seat No.

B.Sc. – I (Semester – II) (CGPA Pattern) Examination, 2016
STATISTICS (Paper – II)
Descriptive Statistics, Probability and Probability Distribution – II

Day and Date : Monday, 4-4-2016　　　　　　　　　　　　　Max. Marks : 70
Time :10.30 a.m. to 1.00 p.m.

*N.B. : Figures to the **right** indicates **full** marks.*

SECTION – I
(Descriptive Statistics, Probability)

1. Choose the correct alternative :　　　　　　　　　　　　　　　　　**5**

　1) If the variables X and Y are changes in same direction, then cov(X, Y) is

　　a) zero　　　　　b) positive　　　　c) one　　　　d) negative

　2) If there are n attributes, then the total number of ultimate class frequencies is

　　a) 2^n　　　　　b) 2^{n-1}　　　　c) 2^{n+1}　　　　d) 3^n

　3) The data are consistent if M is

　　a) less than (A)　　　　　　　b) greater than (A)

　　c) one third of (A)　　　　　　d) none of these

　4) If r = 0, the angle between two regression lines is

　　a) 0　　　　b) $\dfrac{\pi}{2}$　　　　c) $\dfrac{\pi}{3}$　　　　d) $\dfrac{\pi}{6}$

　5) In Paasche's price index, _____ is used as a weight.

　　a) Quantity in base year　　　　b) Quantity in current year

　　c) Price in base year　　　　　　d) Price in current year

2. Answer **any five** of the following :　　　　　　　　　　　　　**10**

　i) Define Fisher's price and quantity index number.

　ii) What are the lines of regression ?

iii) With usual notation prove that :

  a) $r = \sqrt{byx \cdot bxy}$

  b) $byx + bxy \geq 2r$.

iv) State the conditions of consistency of two attributes A and B.

 v) If A and B are two attributes, then prove that coefficient of association Q lies between – 1 and + 1.

vi) Explain linear and non-linear correlation.

vii) Write short note on scatter diagram.

3. A) Answer **any two** of the following : **10**

   i) A random sample of n observation gives the coefficient of correlation r and $\sigma_x = \sigma_y$. Show that correlation coefficient between x and x + y is

   $$\sqrt{\frac{1+r}{2}}.$$

   ii) What is time reversal test of consistency ? Verify the same for Fisher's index number.

   iii) If two attributes A and B are independent show that

      i) A, β and

      ii) α, β are independent.

  B) Answer **any one** of the following : **10**

   i) Derive the conditions of consistency in case of three attributes A, B and C.

   ii) Obtain the expression for the acute angle θ between the two regression lines. Interpret the results for $\theta = 0$, $\theta = \pi/2$.

SECTION – II
(Probability Distributions – II)

1. Choose the correct alternative : **5**

   1) If X is a discrete r.v. then $E\left[\dfrac{X-A}{n}\right]$ is

      a) $E\left[\dfrac{X}{n}\right]$ b) $\dfrac{1}{n}E(X) - \dfrac{A}{n}$ c) $E(X-A)$ d) $E(X)$

2) Given the following joint p.m.f. of (X, Y) what is the value of F(1, 2) ?

X \ Y	1	2
1	0.1	0.4
2	0.2	0.3

  a) 0.1   b) 0.3

  c) 0.5   d) Cannot be determined

3) If (X, Y) are uncorrelated r.v. then

  a) Corr. (X, Y) = 0   b) X and Y are independent

  c) P(X, Y) = P(X) P(Y)   d) All the above

4) If X and Y are independent Binomial random variables with parameters (n_1, p_1) and (n_2, p_2) respectively, then X + Y is Binomial if

  a) $p_1 = p_2$ b) $n_1 = n_2$

  c) $n_1 = n_2$ and $p_1 = p_2$ d) cannot be applied

5) If X is a random variable having

  P(X) = 1   if X = 1

      = 0   otherwise

  then the distribution of X is

  a) One point   b) Two point   c) Bernoulli   d) Uniform

2. Answer **any five** of the following :   **10**

  i) Define mathematical expectation of r.v. X.

  ii) Define one point and two point random variables.

  iii) Let V(X) = 25 then, find

$$\text{Cov}\left(\frac{X}{5}, \frac{5-X}{5}\right)$$

  iv) The joint pmf of (X, Y) is given by

    $P(x, y) = K (x^2 + y^2)$ $x = -1, 1$

                                      $y = -2, 2$

    Obtain the constant K.

v) State and prove the relation between mean and variance of Binomial distribution.

vi) Construct the joint p.m.f. of (X, Y).

vii) Let X and Y are independent r.v. with means 10 and 20 and variances 2 and 3 respectively. Find the variance of 3X + 4Y.

3. A) Answer **any two** of the following : **10**

i) Define discrete uniform distribution and obtain its mean and variance.

ii) State and prove additive property of Binomial distribution.

iii) State :

a) r^{th} central moment of r.v. X.

b) Multiplication theorem of expectation.

B) Answer **any one** of the following : **10**

i) Define probability generating function (pgf) of a r.v. X. Show that it is not independent of change of origin and scale.

ii) The joint p.m.f. of (X, Y) is given by

X \ Y	– 1	0	1
– 1	0	0.2	0
0	0.1	0.2	0.1
1	0.1	0.2	0.1

i) Show that X and Y are uncorrelated.

ii) Obtain conditional distribution of X given Y = 0.

iii) Obtain E[X|Y=0].

_____

SLR-W – 20

B.Sc. (Part – I) (Semester – II) Examination, 2016
ZOOLOGY (Paper – II) (CGPA Pattern)
(Animal Diversity – II and Ecology, Ethology, Evolution and Applied Zoology

Day and Date : Monday, 4-4-2016   Total Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions :   1) **Draw** neat labelled diagrams **wherever** necessary.

2) Figures to the **right** indicate **full** marks.

SECTION – I

(Animal Diversity – II)

1. Rewrite the following sentences choosing alternative given below.   **5**

   1) Petromyzon has _____ pairs of gills.

      a) Six   b) Seven   c) Eight   d) Nine

   2) The fertilization in frog is

      a) Internal   b) External   c) In uterus   d) None of these

   3) The age of fish can be calculated by counting lines of growth in _____ scales.

      a) Cycloid   b) Ctenoid   c) Ganoid   d) Placoid

   4) The common openings for digestive, genital and excretory systems in frog is called as

      a) Anus   b) Cloaca   c) Uterus   d) Rectum

   5) Ventricles of brain are filled with a fluid known as

      a) Lymph   b) Mucous

      c) Cerebrospinal fluid   d) Pericardial fluid

2. Answer **any five** of the following : **10**

   i) Excretion in frog.

  ii) Sexual dimorphism in frog.

 iii) Paired fins in fish.

 iv) Tadpole of frog.

  v) Red blood corpuscles of frog.

 vi) Ammocoetus larva.

vii) Pelvic girdle of frog.

3. A) Write short notes on **any two** of the following : **10**

   i) Comment on parental care in amphibia.

  ii) Draw a neat labelled diagram of internal structure of heart of frog.

 iii) Enlist the salient features of Cyclostomes.

B) Answer **any one** of the following : **10**

   i) Describe the brain of frog and its functions of various parts.

  ii) What is cleavage ? Describe the blastula stage and its fate map.

SECTION – II

(Ecology, Ethology, Evolution and Applied Zoology)

1. Rewrite the following sentences choosing alternative given below. **5**

  1) The fossil study is called as

    a) Palaeontology   b) Litoentology

    c) Osteoentology   d) Paleogeography

  2) _____ is considered as a social insect.

    a) Honey bee   b) Cockroach   c) Silkmoth   d) Housefly

  3) _____ are also called as primary consumers.

    a) Carnivores   b) Decomposers

    c) Scavengers   d) Herbivores

4) Decomposers are also called as

   a) Micro consumers   b) Macro consumers

   c) Microorganisms   d) Macroorganisms

5) The culture of earthworm is called

   a) Sericulture   b) Apiculture   c) Vermiculture   d) Silviculture

2. Answer **any five** of the following :   **10**

  i) Ethology.

 ii) Symbiosis.

iii) Biome.

iv) Biosphere.

 v) Herbivores.

vi) Pearl culture.

vii) Ecological pyramid.

3. A) Write short notes on **any two** of the following :   **10**

   i) Describe the courtship behavior in birds.

  ii) Describe the foodchain of an ecosystem.

 iii) Describe the phenomenon mimicry with a suitable examples.

  B) Answer **any one** of the following :   **10**

   i) What is Vermiculture ? Describe Vermicompost and Vermiwash.

  ii) Describe the abiotic factors of a typical ecosystem.

_____

B.Sc. – I (Semester – II) (C.G.P.A. Pattern) Examination, 2016
MATHEMATICS (Paper – II)
Geometry and Differential Equation

Day and Date : Tuesday, 5-4-2016　　　　　　　　　　　　　Max. Marks : 70

Time : 10.30 a.m. to 1.00 p.m.

Instructions : 1) ***All*** questions are ***compulsory***.

　　　　　　　　2) Figures to the ***right*** indicate ***full*** marks.

SECTION – I
(**Geometry**)

1. Select the correct alternative for **each** of the following. 　　　　**5**

　　1) The direction cosine of normal to the plane $x + y + z = 3$ are _____

　　　　a) 1, 1, 1　　　　　　　　　　　　b) $\sqrt{3}, \sqrt{3}, \sqrt{3}$

　　　　c) $\dfrac{1}{\sqrt{3}}, \dfrac{1}{\sqrt{3}}, \dfrac{1}{\sqrt{3}}$　　　　　　　d) none of these

　　2) The radius of spheres $x^2 + y^2 + z^2 + 4x - 12 = 0$ is _____

　　　　a) 2　　　　　　b) 4　　　　　　c) 12　　　　　　d) 3

　　3) Every equation of first degree in x, y, z represents _____

　　　　a) a circle　　　b) a line　　　　c) a plane　　　d) sphere

　　4) The polar form of cartesian equation $x^2 + y^2 = 2ax$ is _____

　　　　a) $r = 3a \cos \theta$　　　　　　　　b) $r = 2a \cos \theta$

　　　　c) $r = a \sin \theta$　　　　　　　　d) none of these

　　5) If, by rotation of axes through an angle θ the expression $3x^2 + 2xy + 3y^2 - 18x - 22y + 50 = 0$ does not contain cross product term xy then $\theta =$ _____

　　　　a) $\dfrac{\pi}{3}$　　　　b) $\dfrac{\pi}{6}$　　　　　　c) $\dfrac{\pi}{4}$　　　　d) $\dfrac{\pi}{2}$

P.T.O.

2. Attempt **any five** of the following 10

   1) Transform the equation $2x^2 + y^2 - 4x + 4y = 0$ parallel axes through $(1, -2)$.

   2) Find the polar co-ordinates of the points whose cartesian co-ordinates are given as $A(\sqrt{3}, 1)$.

   3) Find the angle between the lines whose direction ratios are $(5, -12, 13)$ and $(-3, 4, 5)$.

   4) Find the equation of the sphere having the join of $A(-1, 2, 3)$ and $B(1, 3, -4)$ as its diameter.

   5) Find the centre and radius of the sphere $2x^2 + 2y^2 + 2z^2 - 4x - 8y + 4z + 5 = 0$.

   6) Find the distance of the point $P(3, 4, 2)$ from the plane $6x - 2y + 3z + 7 = 0$.

   7) Identify the conic given following equation $4x^2 - 12xy + 9y^2 + 4x + y - 5 = 0$.

3. A) Attempt **any two** of the following. 10

   1) Show that the second degree equation $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ represents a sphere with centre $(-u, -v, -w)$ and radius $= \sqrt{u^2 + v^2 + w^2 - d}$

   2) Find the equation of the plane through three points $A(1, 1, 1)$, $B(1, -1, 1)$ and $C(-7, -3, -5)$.

   3) Find the angle through which the rectangular axes are rotated so that $ax^2 + 2hxy + by^2$ transform into $a'x'^2 + b'y'^2$.

  B) Attempt **any one** of the following. 10

   1) If, by rotation of axes of the expression $ax^2 + 2hxy + by^2$ becomes $a'x'^2 + 2h'x'y' + b'y'^2$ then prove that $a + b = a' + b'$ and $ab - h^2 = a'b' - h'^2$

   2) a) Show that the plane $Ax + By + Cz = D$ touches the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ if and only if $(Au + Bv + Cw + D)^2 = (A^2 + B^2 + C^2)(u^2 + v^2 + w^2 - d)$.

     b) Obtain the equation plane through the point $(-1, 3, 2)$ and perpendicular to the two planes $x + 2y + 2z = 5$ and $3x + 3y + 2z = 8$.

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SECTION – II
(**Differential Equation**)

</div>

1. Select the correct alternative for **each** of the following. 5

   1) The differential equation $(2x + 3y + 1)dx + (3x + 4y - 1)dy = 0$ is of the form _____

    a) Non-homogeneous   b) Homogeneous

    c) Variable separable   d) None of these

2) The general solution of $\dfrac{d^2y}{dx^2} + 5\dfrac{dy}{dx} + 4y = 0$ is _____

    a) $y = c_1e^{-x} + c_2e^{4x}$ b) $y = c_1e^{-x} + c_2e^{-4x}$

    c) $y = c_1e^{x} + c_2e^{-4x}$ d) none of these

3) If $f(D)y = e^{ax}.V$ where V is a function of x and $f(D)$ is polynomial in $D = \dfrac{d}{dx}$

    then particular integral $\dfrac{1}{f(D)}e^{ax}.V =$ _____

    a) $e^{ax}\dfrac{1}{f(a)}V$ b) $\dfrac{e^{ax}}{f(D+a)}$

    c) $e^{ax}\dfrac{1}{f(D+a)}V$ d) none of these

4) The differential equation $Mdx + Ndy = 0$ is exact differential if _____

    a) $\dfrac{\partial M}{\partial N} = \dfrac{\partial N}{\partial x}$ b) $\dfrac{\partial M}{\partial y} = \dfrac{\partial N}{\partial x}$

    c) $\dfrac{\partial^2 M}{\partial x \partial y} = \dfrac{\partial^2 N}{\partial y \partial x}$ d) none of these

5) The value of $\dfrac{1}{D^2}(x^4 + 3x)$ is _____

    a) $\dfrac{x^6}{30} + \dfrac{x^2}{2}$ b) $\dfrac{x^6}{30} - \dfrac{x^3}{3}$

    c) $\dfrac{x^5}{30}$ d) none of these

2. Attempt **any five** of the following.   **10**

    1) Solve $\dfrac{d^3y}{dx^3} + 3\dfrac{d^2y}{dx^2} + 3\dfrac{dy}{dx} + y = 0$

    2) Solve $\dfrac{dy}{dx} + \sqrt{\dfrac{1-y^2}{1-x^2}} = 0$

3) Solve $(2x + 4y + 3)\dfrac{dy}{dx} = (2y + x + 1)$

4) Find the value of $\dfrac{1}{D^2}x^3$

5) Solve $(D^3 - 3D + 2)y = x$

6) Solve $\dfrac{dy}{dx} + \dfrac{4x}{1+x^2}y = \dfrac{1}{(1+x^2)^3}$

7) Find the integrating factor for the differential equation

$$\frac{dy}{dx} - \frac{2x}{1-x^2}y = \frac{1}{(1-x^2)^{\frac{3}{2}}}$$

3. A) Attempt **any two** of the following. **10**

   1) Explain the method of solving homogeneous differential equation of 1st order and 1st degree.

   2) Solve $(1+x^2)\dfrac{dy}{dx} + 2xy = \cos x$.

   3) Solve $\dfrac{d^2y}{dx^2} - 3\dfrac{dy}{dx} + 2y = e^{3x}$.

B) Attempt **any one** of the following. **10**

   1) Explain the method of solving the Bernoulli's differential equation

   $\dfrac{dy}{dx} + Py = Qy^n$ where P and Q are functions of x only, hence solve

   $\left(1-x^2\right)\dfrac{dy}{dx} + xy = xy^2$.

   2) With usual notation prove that $\dfrac{1}{f(D^2)}\sin ax = \dfrac{1}{f(-a^2)}\sin ax$, hence solve

   $\dfrac{d^3y}{dx^3} - y = \sin 2x$.

Seat No.	

B.Sc. – I (Semester – II) Examination, 2016
BOTANY (Paper – II) (CGPA)
Gymnosperm and Angiosperm, Cell Biology, Genetics and Plant Biotechnology

Day and Date : Tuesday, 5-4-2016   Total Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

N. B. : 1) *All questions are compulsory.*
          2) ***Draw*** *neat and labelled diagram* ***wherever*** *necessary.*
          3) *Figures to the* ***right*** *indicate* ***full*** *mrks.*

SECTION – I
(Gymnosperms and Angiosperms)

1. Rewrite the following sentences by choosing correct answer from the given alternatives :   **5**

   1) Pollination is gymnosperms is _____
      a) Entomophilous   b) Anemophilous
      c) Hydrophilous   d) Malcophilous

   2) _____ system of classification is accepted in gymnosperms.
      a) Seward's   b) Arnold's
      c) Sporne's   d) None of these

   3) In the floral formula 'K' stands for _____
      a) Calyx   b) Corolla   c) Perianth   d) Androecium

   4) _____ vegetation is dominant on Earth.
      a) Angiospermic   b) Gymnospermic
      c) Algal   d) Lichens

   5) Cassia ariculata belongs to family _____
      a) Amaryllidaceae   b) Nyctaginaceae
      c) Solanaceae   d) Caeasalpinaceae

2. Answer **any five** of the following : **10**

   i) Mention two economic importances of gymnosperms.

   ii) Write two salient features of gymnosperms.

   iii) Mention the leaf types in <u>Cycas</u>.

   iv) Enlist any two type methods you have studied in ICBN.

   v) What is meant by perigynous flower ?

   vi) Write on fleshy drupe.

   vii) Mention two economic importance of Solanaceae family.

3. A) Answer **any two** of the following : **10**

   i) Write on internal structure of coralloid root of <u>Cycas</u>.

   ii) Give the merits of Bentham and Hooker's system of classification.

   iii) Write on cymose type of inflorescence.

  B) Answer **any one** of the following : **10**

   i) Write in brief the leaflet anatomy of <u>Cycas</u>.

   ii) Give the distinguishing characters of any two families :

     a) Annonaceae

     b) Convolvulaceae

     c) Nyctaginaceae

     d) Amaryllidaceae.

SECTION – II
(Cell Biology, Genetics and Plant Biotechnology)

1. Rewrite the following sentences by choosing correct answer from the given alternatives : **5**

   1) In eukaryotic cell _____ of ribosomes are present.

     a) 60S   b) 40S   c) 70S   d) 80S

   2) Enzyme catalyse is present in _____

     a) lysosomes   b) Glyoxysomes

     c) Peroxysomes   d) Ribosomes

3) The _____ protects and supports the entire plant body.

    a) Cell wall   b) Plasmamembrane

    c) Plasmodesmata   d) Cell membrane

4) The application of living organisms to industrial processes is known as _____

    a) Biology   b) Microbiology   c) Algalogy   d) Biotechnology

5) The _____ is known as father of genetics.

    a) Bartener   b) John Gregor Mendel

    c) Naudin   d) Goss

2. Answer **any five** of the following :   **10**

  i) Sketch and label the prokaryotic cell.

  ii) State any two functions of nucleus.

  iii) Define Microbodies.

  iv) Give any two functions of cell membrane.

  v) What are complementary genes ?

  vi) Define alleles.

  vii) What are biofertilizers ?

3. A) Answer **any two** of the following :   **10**

    i) Write the significance of mitosis.

    ii) Describe the structure of mitochondrion.

    iii) State the functions of glyoxysomes.

  B) Answer **any one** of the following :   **10**

    i) Describe Mendel's Law of Dominance and Segregation with suitable example.

    ii) Describe the scope of Biotechnology.

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Seat
No.

B.Sc. (Part – I) (Semester – II) (CGPA Pattern) Examination, 2016
ELECTRONICS (Paper – II)
Electronic Devices and Digital Electronics

Day and Date : Wednesday, 6-4-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** labelled diagrams **wherever** necessary.
4) **Use** of log table and calculator is **allowed**.

SECTION – I
(Electronic Devices)

1. Select correct alternative for the following :   **5**

   i) When pure semiconductor is heated, its resistance
      a) increases   b) decreases
      c) remains same   d) may increase or decrease

   ii) A zener diode is used as
      a) an amplifier   b) an oscillator
      c) a voltage regulator   d) a rectifier

   iii) The α of a transistor is 0.99, then value of β is
      a) 9   b) 99   c) 999   d) 90

   iv) In an n-channel JFET, the charge carriers are
      a) electrons   b) holes
      c) both electrons and holes   d) ions

   v) A TRIAC can be triggered into conduction by applying _____ at the gate.
      a) Only positive voltage (pulse)
      b) Only negative voltage (pulse)
      c) Both positive or negative (pulse) voltage
      d) None of these

P.T.O.

2. Answer **any five** of the following : **10**

   i) Explain, why intrinsic semiconductor acts as an insulator at absolute zero temperature.

  ii) Draw symbols of zener diode and photo diode with labels.

 iii) State in which way transistor is biased.

 iv) Draw symbols of PNP and NPN transistors with labels.

  v) State any four applications of JFET.

 vi) State any four applications of UJT.

vii) Calculate the value of transconductance (g_m) of a JFET, if μ = 80 and r_d = 400 KΩ.

3. A) Answer **any two** of the following : **10**

   i) Write short note on N-type semiconductor.

  ii) Explain avalanche and zener breakdown in zener diode.

 iii) Explain construction and working of SCR.

  B) Answer **any one** of the following : **10**

   i) Explain output characteristics of transistor in CB configuration and explain how to determine the α.

  ii) Explain construction and working of N-channel JFET.

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SECTION – II
(Digital Electronics)

</div>

1. Select correct alternative for the following : **5**

   i) In TTL maximum value of sourcing current is

    a) 80 μA   b) 16 mA   c) 1.6 mA   d) 1 mA

  ii) T-flip-flop can be used to construct

    a) Counter   b) Decoder   c) Encoder   d) Multiplexer

 iii) IC 7447 is

    a) Encoder   b) Decoder   c) Counter   d) Multiplexer

 iv) _____ counter is applied clock input simultaneously.

    a) Asynchronous   b) Synchronous

    c) Combination   d) None

  v) IC 7495 contains _____ flip-flops.

    a) 1   b) 2   c) 3   d) 4

2. Answer **any five** of the following : **10**

   i) Explain noise margin in TTL.

   ii) Draw MOD-5 counter diagram using IC 7490.

   iii) What is decoder ?

   iv) State types of shift registers.

   v) Compare multiplexer and demultiplexer.

   vi) What is meant by synchronous counter ?

   vii) Give truth table of RS flip flop using NOR gates.

3. A) Answer **any two** of the following : **10**

   i) Explain following specifications of TTL logic family - Fan-in, Fan-out, Propagation delay, sourcing and sinking current.

   ii) Write a note on decimal to BCD encoder.

   iii) Explain ring counter using IC 7495.

  B) Answer **any one** of the following : **10**

   i) Explain operation of JK flip-flop with timing diagram.

   ii) Describe 1 : 8 demultiplexer.

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Seat No.

B.Sc. (Part – I) (Semester – II) (CGPA Pattern) Examination, 2016
PSYCHOLOGY (Paper – II)
General Psychology and Human Development

Day and Date : Wednesday, 6-4-2016   Total Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

SECTION – I

(**General Psychology**)

1. Choose the correct alternative.   **5**

   i) A _____ holding onto information for some period of time.

   A) storage   B) memory   C) S.M.T.   D) retrieval

   ii) The first step in the memory system is to get _____ information.

   A) sensory   B) mental   C) behavioral   D) emotional

   iii) The _____ stage of memory is sensory.

   A) first   B) third   C) fourth   D) sixth

   iv) _____ theory talk about need.

   A) Drive reduction   B) Need

   C) Arousal   D) Self

   v) The final _____ need proposed by McClelland is the need for power.

   A) psychological   B) sociological   C) economical   D) incentive

2. Answer the following (**any five**)   :   **10**

   1) Define intelligence.

   2) Define personality.

3) How many types of memory ?

4) Who proposed the Hierarchy of need theory ?

5) Define emotion.

6) Who introduce self theory of motivation ?

3. Write the short note (**any two**) : **10**

1) Instinct Approaches

2) Decay Theory

3) Schechter-Singer and cognitive arousal theory.

4. A) Discuss on the Maslow's Hierarchy of need theory. **10**

OR

B) Explain the three stages of memory.

SECTION – II

(**Human Development**)

1. Fill in the blanks (Multiple Choice). **5**

1) The _____ of Erikson crisis in the major issues of young adulthood in intimacy vs Isolation.
   a) One   b) Third   c) Sixth   d) Fifth

2) Middle age is the years between age
   a) 35 to 65   b) 20 to 35   c) 40 to 65   d) any other

3) _____ sensitivity begins to decline at about age 50.
   a) All   b) Vision   c) Teste   d) Audiction

4) _____ is major health problem in middle age.
   a) Obesity   b) Hypertension   c) Blood pressure   d) Any other

5) _____ people need more medical care than younger ones.
   a) Middle aged   b) Older   c) Elder   d) All

2. Answer **any five** of the following.   **10**

    I) What is approximate age of middle adulthood ?

   II) What are the type of marriage ?

  III) What subject Lewis Terman began his study in 1920 ?

  IV) What is meant by Trait theories ?

   V) Which is the main problem of middle age of adult women ?

  VI) What is meant by monogamy ?

3. Write short notes (**any two**) :   **10**

   1) Smell, Taste, Touch in late adulthood.

   2) Physical development in Middle adulthood.

   3) The female climacteric and menopause.

4. Answer in **any one** of the following.   **10**

   A) Explain the health problem in late-adulthood.

                   OR

   B) Explain the four type of death.

_____

SLR-W – 25

B.Sc. – I (Semester – II) (CGPA Pattern) Examination, 2016
GEOLOGY (Paper – II)
Introduction to General Geology and Physical Geology

Day and Date : Wednesday, 6-4-2016　　　　　　　　　　Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

N. B. : 1) **All** questions are **compulsory**.
　　　　2) Figures to the **right** indicate **full** marks.
　　　　3) **Draw** neat diagrams **wherever** needed.

SECTION – I
(Introduction to General Geology)

1. Fill in the blanks with correct answer given in the options.　　　**5**

　　1) Galaxy is _____ parsecs in diameter.
　　　　a) 10,000　　　b) 1,000　　　c) 100　　　d) 10

　　2) Neptune is the _____ planet from the Sun.
　　　　a) Eighth　　　b) Fifth　　　c) First　　　d) Second

　　3) In equinox on _____ day and night will be equal in duration.
　　　　a) 21 March　　b) 21 April　　c) 21 May　　d) 21 June

　　4) The core has a volume of _____ percent.
　　　　a) 46　　　b) 36　　　c) 26　　　d) 16

　　5) The focus of shallow earthquake is, surface to _____ km.
　　　　a) 70　　　b) 90　　　c) 110　　　d) 120

2. Answer **any five** of the following　　　**10**
　　i) Shape of the Earth.
　　ii) Solstices.
　　iii) Hydrosphere.
　　iv) Seismograph (fig.).
　　v) Solfatras.
　　vi) Volcanic belt.
　　vii) Mesosphere.

3. A) Write short notes on **any two** of the following :   **10**
    i) Explain solar system.
    ii) Explain mesosphere and lithosphere.
    iii) Explain causes of volcano.

B) Answer **any one** of the following :   **10**
    i) Explain 1st, 2nd and 3rd order relief features on the earth.
    ii) Predictions and precautions of earthquakes.

SECTION – II
(Introduction to Physical Geology)

1. Fill in the blanks with correct answer from the given options.   **5**

    1) The removal of loose materials by the blowing action of wind is called _____
      a) Deflation
      b) Cave rock
      c) Ventifacts
      d) Desert Pavements

    2) Condition for the formation of Dune is _____
      a) Strong and constant wind
      b) A source of sand
      c) Obstacles that can initiate the dune formation
      d) All of these

    3) _____ are smaller depressions found on bedrock of streams.
      a) Plunge pools   b) Pat holes
      c) Terrace   d) Rapids

    4) _____ are rounded mounds of till with elliptical bases.
      a) Eskers   b) Drumlin
      c) Kames   d) Kettles

    5) Sea cliff retreats leaving flat platform which is called _____
      a) Wave cut terrace
      b) Sea caves
      c) Cove
      d) Headlands

2. Answer **any five** of the following : **10**

   i) Rapids

   ii) Sea notch

   iii) Grooves

   iv) Varves

   v) Earth pillars

   vi) Deflation armors

   vii) Talus.

3. A) Write short notes on **any two** of the following : **10**

      i) Explain chemical weathering.

      ii) Explain erosional features of stream-cascades and river terraces.

      iii) Explain erosional features of ocean-head land and stacks.

   B) Answer **any one** of the following : **10**

      i) Explain exogenic and endogenic forces acting on the earth.

      ii) Explain depositional features of glaciers as erratics, moraines, drumlines and kems.

Seat No.

B.Sc. – I (Semester – II) (CGPA) Examination, 2016
MICROBIOLOGY (Paper – II)
Microbial Physiology and Applied Microbiology – I

Day and Date : Wednesday, 6-4-2016　　　　　　　　Max. Marks : 70

Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Figures to the **right** indicate **full** marks.

SECTION – I

(Microbial Physiology)

1. Rewrite the following sentences by selecting the correct alternative :　　**5**

　i) _____ is an example of coenzyme.

　　a) NAD　　　　b) Zn^{++}　　　　c) Fe^{++}　　　　d) Mg^{++}

　ii) Because of presence of _____ MacConkey's agar becomes selective.

　　a) Na-citrate　　　　　　b) Sodium formate

　　c) Sodium chloride　　　　d) Na-taurocholate

　iii) _____ is not nutrient for bacteria.

　　a) Peptone　　　　　　b) Nacl

　　c) Yeast extract　　　　d) Meat extract

　iv) In protein amino acids are linked by _____ bond.

　　a) Peptide　　　　　　b) Disulphide

　　c) Ester　　　　　　　d) Hydrogen

　v) _____ is an example of homopolysaccharide.

　　a) Starch　　　　　　b) Glucose

　　c) Lactose　　　　　　d) Sucrose

2. Answer **any five** of the following :   **10**

   i) Define active site.

   ii) Role of peptone in culture media.

   iii) Define autotrophs.

   iv) Lag phase.

   v) Heteropolysaccharide.

   vi) Define catabolism.

   vii) Define inducible enzymes.

3. A) Write short notes on **any two** of the following :   **10**

     i) Explain classification of sugars on the basis of number of carbon atoms.

     ii) Give an account of structural levels of proteins.

     iii) Explain photoautotrophs and photoheterotrophs.

   B) Answer **any one** of the following :   **10**

     i) Give an account of 'TCA cycle'.

     ii) Explain in brief common components of media and their role.

<div align="center">

SECTION – II

(Applied Microbiology – I)

</div>

1. Rewrite the following sentences by selecting correct answers from the given alternatives :   **5**

   i) _____ are smaller than 0.1 mm in diameter.

     a) Droplets   b) Droplet nuclei

     c) Dusts   d) Infections dust

   ii) _____ is main protein present in milk.

     a) Casein   b) Gelatin   c) Albumin   d) Globulin

   iii) Tuberculosis is transmitted by

     a) Water   b) Animals   c) Air   d) Food

   iv) _____ is used for disinfection of water.

     a) HCl   b) H_2SO_4 c) NaOH   d) Chlorine

   v) EMB agar is used for _____ test.

     a) Confirmed   b) Presumptive   c) Completed   d) MPN

2. Answer **any five** of the following : **10**

   i) Define pandemic diseases.

   ii) What is significance of MBRT test ?

  iii) What is infections dust ?

  iv) Define acute diseases.

   v) List the components in milk.

  vi) Why the E.Coli is considered as an indicator of fecal pollution of water ?

 vii) Give the normal flora of water.

3. A) Write short notes on **any two** of the following : **10**

   i) Sources of microorganisms in milk.

   ii) MPN test.

  iii) Microbiological examination of air.

  B) Answer **any one** of the following : **10**

   i) Describe in detail modes of transmission of diseases.

   ii) Describe in detail differentiation of coliforms by IMViC test.

_____

Seat No.

B.Sc. (Part – II) (Semester – III) (New-CGPA)Examination, 2016
CHEMISTRY
Organic Chemistry (Paper – III)
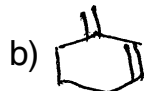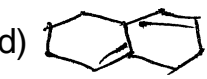
Day and Date : Thursday, 7-4-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Draw **neat** diagram and give equation **wherever** necessary.
3) Figures to the **right** indicates **full** marks.
4) **Use** of log table or calculator is **allowed**.
5) Atomic weights : H = 1, C = 12, N = 14, O = 16, Cl = 35.5, I = 127, Ag = 108.
6) Spectroscopic chart is **supplied**.

1. Choose correct alternative from each of the following.   **14**

   i) Which of the following electronic transitions require maximum energy ?

      a) $\sigma \to \sigma^*$ b) $\pi \to \pi^*$

      c) $n \to \sigma^*$ d) $n \to \pi^*$

   ii) In ethane when the dihedral angle is zero then the configuration is known as _____

      a) skew   b) staggered

      c) eclipsed   d) none of these

   iii) Glycerol react with $KHSO_4$ to give _____

      a) oxalic acid   b) formaldehyde

      c) tartaric acid   d) acrolein

   iv) Reimer-Tiemann reaction involves _____ intermediate.

      a) free radical   b) carbocation

      c) carbanion   d) carbene

   v) Ethylene oxide on treatment with C_2H_5Li forms

      a) 1-butanol   b) 2-butanol

      c) methanol   d) ethanol

vi) Malic acid is

   a) mono carboxylic acid

   b) unsaturated acid

   c) monohydroxy dicarboxylic acid

   d) halo acid

vii) Diazotisation reaction is carried out at low temperature because _____ is unstable and decomposes.

   a) HNO_2 b) diazonium salt

   c) both a) and b)   d) none of these

viii) Shift of absorption maxima (λ_{max}) to longer wavelength is known as _____ shift.

   a) hypsochromic   b) bathochromic

   c) hyper chromic   d) hypochromic

ix) _____ is an example of homoannular diene.

   a)   b)   c)   d)

x) Which of the following is the dihydric alcohol ?

   a) catechol   b) resorcinol

   c) ethylene glycol   d) glycerol

xi) D and L nomenclature is also known as

   a) absolute configuration   b) relative configuration

   c) conformation   d) none of these

xii) The reaction $2HCHO + NaOH \xrightarrow{\Delta} CH_3OH + HCOONa$ is known as

   a) benzoin condensation   b) Perkin reaction

   c) aldol condensation   d) Cannizzaro's reaction

xiii) Anisole on heating with conc. HI gives

   a) Iodobenzene   b) Phenol

   c) Benzyl alcohol   d) Benzene

xiv) Among the following which is unsaturated acid ?

   a) citric acid   b) acrylic acid

   c) phthalic acid   d) chloroacetic acid

2. Solve **any seven** of the following : **14**

   i) Calculate the λ_{max} of the following diene and enone using Woodward-Fieser rules.

     a)

     b)
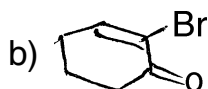
   ii) Assign E or Z configuration to the following compound.

     a)

     b)

   iii) Complete the following reactions.

     a)

     b)
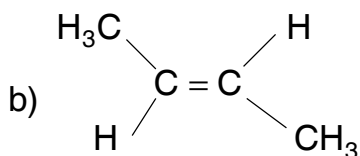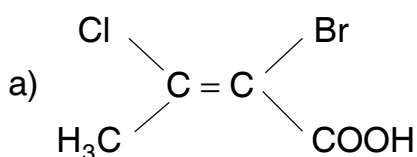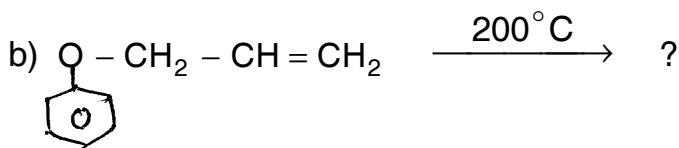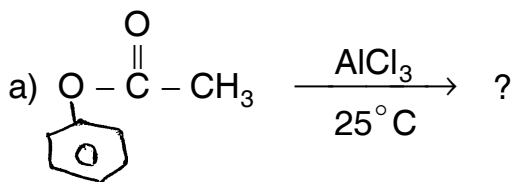
   iv) Discuss the reactivity of carbonyl group.

   v) Give the preparation of anisole by Williamson's synthesis.

   vi) What happens when cinnamic acid is reacted with

     a) Br_2 and

     b) Chromic acid

   vii) Starting from Benzene diazonium chloride how will you prepare a) Benzene and phenyl hydrazine.

viii) Give one method of preparation of succinic acid.

ix) Complete the following reaction.

a) $CH_2 - CH_2$ (epoxide with O) $+ NH_3 \longrightarrow$?

b) $CH_2 - CH_2$ (epoxide with O) $+ HBr \longrightarrow$?
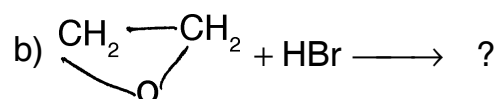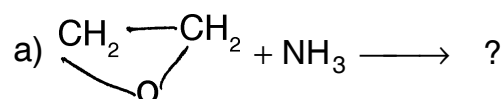
3. A) Attempt **any two** of the following : **10**

   i) Explain the applications of uv spectroscopy.

   ii) Write note on Beckmann transformation.

   iii) Write synthesis and uses of congo-red.

   B) During Ziesel's method 2.52×10^{-5} kg of dry AgI was formed by 2.18×10^{-5} kg of organic compound having molecular formula $C_{11}HgNO_3$. Calculate the percentage and number of $-OCH_3$ groups per molecule. **4**

4. Attempt **any two** of the following : **14**

   i) Discuss the effect of conjugation on the position of absorption bands of uv spectra.

   ii) What is conformational isomerism ? Explain conformational isomerism in n-butane.

   iii) What are pinacols ? How are they prepared ? Give the pinacol-pinacolone rearrangement reaction with mechanism.

5. Attempt **any two** of the following : **14**

   i) Discuss the mechanism of Perkin's reaction.

   ii) Give one method of preparation of ethylene glycol. What is the action of following on it ?

   a) HCl

   b) Lead tetra acetate.

   c) Per iodic acid

   d) Sodium

   e) HNO_3.

   iii) Give two methods of preparation of phthalic acid. Give their uses. What is the action of heat and ammonia on phthalic acid.

Spectroscopic Chart

Woodward's-Fieser's rules for calculating ultraviolet absorption maxima

A) For substituted dienes (Ethanol solution)

No.	Basic Value	λ_{mas} (nm)
1)	Acyclic and heteroannular dienes	214
2)	Homoannular dienes	253
3)	Addition for each substituent	
	a) – R alkyl (including part of carbocyclic ring)	5
	b) – OR (alkoxy)	6
	c) – Cl, –Br	5
	d) – OCOR (acyloxy)	0
	e) – NR_2, (N – alkyl)	60
	f) – SR (S – alkyl)	30
	g) – CH = CH – additional conjugation i.e. extending conjugation	30
	h) If one double bond is exocyclic to one ring	5
	i) If exocyclic to two rings simultaneously	10

B) Rules for α, β – Unsaturated Enones (Ethanol Solution)

No.	Basic value	λ_{max} (nm)
1)	Ketones : $-\overset{\beta}{C}=\overset{\alpha}{C}-CO-$	
	a) Acyclic or 6 – membered ring	215
	b) 5 – membered ring	202
2)	Aldehydes $-\overset{\|}{C}=\overset{\|}{C}-CHO$	207
3)	Extended Conjugation	30
	$-\overset{\delta}{C}=\overset{\gamma}{C}-\overset{\beta}{C}=\overset{\alpha}{C}-CO-$ etc.,	
4)	Homodiene component	39
5)	a) If one double bond is exocyclic to one ring	5
	b) If exocyclic to two rings simultaneously	10
6)	Addition for substituents	

Substituents   **Position**

		α	β	γ	δ
a)	– R alkyl (including part of carbocyclic ring)	10	12	18	18
b)	– OR (alkoxy)	35	30	17	31
c)	– OH (hydroxy)	35	30	–	50
d)	– SR (thioether)	–	85	–	–
e)	– Cl (chloro)	15	12	–	–
f)	– Br (bromo)	25	30	–	–
g)	– OCOR (acyloxy)	6	6	–	6
h)	– NH_2, – NHR, – NR_2	–	95	–	–

Solvent correction

	Solvent	
a)	Ethanol	0
b)	Methanol	0
c)	Dioxan	–5
d)	Chloroform	–1
e)	Ether	–7
f)	Water	+8
g)	Hexane	– 11
h)	Cyclohexane	11

Seat
No.

B.Sc. II (Computer Sci.) (Semester – III) (New CGPA) Examination, 2016
(Paper – III) : OBJECT ORIENTED PROGRAMMING USING C++

Day and Date : Thursday, 7-4-2016　　　　　　　　　　Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) *Figures to the **right** indicate **full** marks.*

1. Choose correct alternative.　　　　　　　　　　　　　　　　**14**

    1) _____ are implicity executes whenever an object is created.

        a) Constructors　　b) Destructor　　c) Both a and b　　d) None of these

    2) _____ is a process of hiding data without knowing its back ground details.

        a) Polymorphism　　　　　　　　b) Data Abstraction

        c) Message Passing　　　　　　　d) Class

    3) Private member functions of class can be accessible within non-member function.

        a) True　　　　　　　　　　　　b) False

    4) _____ operator cannot be overloaded.

        a) new　　　　　　b) sizeof　　　　c) >>　　　　d) None of these

    5) In protected derivation of class, the public data of base class becomes _____ in derived class.

        a) public　　　　　b) private　　　　c) both a and b　　d) protected

    6) In C++, we cannot convert one data type into another data type.

        a) True　　　　　　　　　　　　b) False

    7) Constructor can be virtual whereas destructor not virtual.

a) True   b) False

8) _____ function works like Macros in C++.

a) inline   b) friend   c) non inline   d) both b and c

9) In OOP, _____ communicates with each other.

a) Object   b) Function   c) Operators   d) both b and c

10) Creating new class from exiting class is called as _____

a) Encapsulation   b) Delegation   c) Inheritance   d) Polymorphism

11) _____ operator is overloaded with 'cin' object.

a) Insertion   b) Extraction   c) Both a and b   d) None of these

12) Many function having same name with different signature called _____

a) function overloading   b) operator overloading

c) virtual function   d) both a and b

13) 'this' can be used within static member function of class.

a) True   b) False

14) _____ variable creates alise for existing variable.

a) Value   b) Pointer   c) Reference   d) both a and b

2. Answer **any seven** of the following: **14**

1) What is type conversion ?

2) Write syntax and use of reference variable.

3) Write use of 'new' and 'delete' operator.

4) Write syntax and use of 'enum' keyword.

5) Differentiate between POP and OOP.

6) Write situation where we make function as virtual.

7) What is inline function ?

8) What is Delegation ?

9) What is Nested class ?

3. A) Attempt **any two** of the following : **10**

    1) Write an object oriented program that prints all prime numbers between 1 to 100.

    2) What is polymorphism ? How compile time polymorphism is achieved in C++ ?

    3) Write a program that demonstrates execution of constructor in inheritance.

  B) What is Operator overloading ? Explain it with suitable example. **4**

4. Answer **any two** of the following : **14**

    1) Write a program that shows different parameter passing techniques in C++.

    2) What is constructor ? Explain all types of constructor's in detail.

    3) Write a program to implement Multi-path inheritance.

5. Answer **any two** of the following : **14**

    1) What is virtual and pure virtual function ? Explain both with suitable example.

    2) Write a program that demonstrate use of common friend function for two different classes.

    3) Write a program to overload + as unary operator that checks entered number is Armstrong or not.

_____

Seat No.

B.Sc. II (Semester – III) Examination, 2016
CHEMISTRY (New CGPA Pattern)
Inorganic Chemistry (Paper – IV)

Day and Date : Saturday, 9-4-2016 Max. Marks : 70

Time : 10.30 a.m. to 1.00 p.m.

Instructions : 1) **All** questions are **compulsory**.

2) Draw neat labeled diagrams wherever necessary.

3) Figures to the **right** indicate **full** marks.

1. Select the most correct alternative for each of the following and rewrite the sentence. **14**

1) In $[Co(NH_3)_6]Cl_3$, ammonia are present in
   a) ionisable sphere
   b) coordination sphere
   c) non-ionisable sphere
   d) outer sphere

2) Chelating agent are always _____ ligands.
   a) monodentate
   b) polydentate
   c) ambidentate
   d) bridging

3) Hydride ion (H^-) is
   a) hard base
   b) soft acid
   c) hard acid
   d) soft base

4) In the production of sulphuric acid _____ catalyst is used.
   a) Mo
   b) Ni
   c) V_2O_5
   d) Fe

5) The hybridization of cobalt ion in $[Co(F)_6]^{3-}$ is
   a) d^2sp^3
   b) sp^3
   c) dsp^2
   d) sp^3d^2

6) DMG is the selective and sensitive reagent for
   a) Fe
   b) Mo
   c) Cu
   d) Ni

P.T.O.

7) Mg^{2+} is
   a) Hard acid
   b) Soft base
   c) Soft acid
   d) Hard base

8) 5-d transition series start with _____ and ends with _____ element.
   a) yttrium, cadmium
   b) scandium, cadmium
   c) lanthanum, mercury
   d) yttrium, zinc

9) Coordination number of Ni^{2+} in the complex $[Ni(en)_3]Cl_3$ is
   a) 2
   b) 4
   c) 6
   d) 8

10) Chelates are used in
    a) analytical chemistry
    b) water softening
    c) removal of Pb^{2+} from blood
    d) all of these

11) Pearson principle used to explain _____ concept of acid and bases.
    a) chelate
    b) HSAB
    c) HASB
    d) hybridisation

12) $KMnO_4$ is dark and intense colour due to _____ transition.
    a) Charge transfer   b) d-d   c) $\sigma - \sigma^*$ d) $\Pi - \Pi^*$

13) The IUPAC nomenclature of $K_4[Fe(CN)_6]$ is
    a) Potassium hexacynoferrate(II)
    b) Potassiumhexacynoferrate(II)
    c) Potassium hexacyno ferrate(II)
    d) Potassium hexa cyno ferrate(II)

14) Colour of Zn^{2+} ions is
    a) blue
    b) brown
    c) red
    d) colourless

2. Solve **any seven** of the following :   **14**

   1) Define ligand with suitable example.

   2) State and explain term coordination number with example.

   3) Draw the structure of optical isomers of $[Co(en)_3]^{3+}$.

   4) Give the structure of Ca-EDTA chelate.

   5) Give the name and structure of two bidentate chelating agents containing both acidic donor groups.

6) Define acid and base according to Lewis concept, with example.

7) What are the limitations of Pearson's acid-base concept ?

8) Explain the catalytic properties of 3d transition elements.

9) Write the observed electronic configuration of chromium and copper.

3. A) Attempt **any two** of the following : **10**

   1) Distinguish between double salt and complex salt.

   2) Write note on geometrical isomerism.

   3) Compare the first transition series with second and third transition series w.r.t. electronic configuration and stability of oxidation state.

   B) What are the limitations of Valence bond theory ? **4**

4. Attempt **any two** of the following : **14**

   1) Explain the applications of hard and soft acid base principle.

   2) Explain the complex of Cu(II) on the basis of VBT with cyanide ligands. Comment on the stability and magnetic property of the complexes.

   3) What are transition elements ? Discuss the colour property of 3d transition elements.

5. Attempt **any two** of the following : **14**

   1) Define metal chelate with examples. Discuss the structural requirement of chelate formation.

   2) Write a detail note on magnetic property of the 3d block element.

   3) Define coordination number. According to Werner's theory, Explain in details of $CoCl_3.5NH_3$ and $CoCl_3.3NH_3$.

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Seat No.

B.Sc. – II (Semester – III) (New) Examination, 2016
COMPUTER SCIENCE
Paper – IV : RDBMS (CGPA)

Day and Date : Saturday, 9-4-2016   Total Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions :   i) **All** questions are **compulsory**.
                              ii) Figure to the **right** indicates **full** marks.

1. Choose and write a correct answer from given **four** alternative :   **14**

   1) A _____ in a table represents a relationship among a set of values.

      a) Column   b) Key   c) Row   d) Entry

   2) For each attribute of a relation, there is a set of permitted values, called the _____ of that attribute.

      a) Domain   b) Relation   c) Set   d) Schema

   3) A domain is atomic if elements of the domain are considered to be _____ units.

      a) Different   b) Indivisible   c) Constant   d) Divisible

   4) Student(ID, name, dept name, tot_cred) in this query which attribute form the primary key ?

      a) Name   b) Dept   c) Tot_cred   d) ID

   5) Which one of the following provides the ability to query information from the database and to insert tuples into, delete tuples from and modify tuples in the database ?

      a) DML (Data Manipulation Language)

      b) DDL (Data Definition Language)

      c) Query

      d) Relational Schema

6) The _____ clause is used to list the attributes desired in the result of a query.

   a) Where   b) Select   c) From   d) Distinct

7) _____ operator is used for appending two strings.

   a) &   b) %   c) || d) _

8) Aggregate functions are functions that take a _____ as input and return a single value.

   a) Collection of values   b) Single value

   c) Aggregate value   d) Both a) and b)

9) All aggregate functions except _____ ignore null values in their input collection.

   a) Count(attribute)   b) Count(*)   c) Avg   d) Sum

10) _____ are useful in SQL update statements, where they can be used in the set clause.

   a) Multiple queries   b) Sub queries

   c) Update   d) Scalar subqueries

11) The statement in SQL which allows to change the definition of a table is

   a) Alter   b) Update   c) Create   d) Select

12) Which of the following is not a function of DBA ?

   a) Network Maintenance   b) Routine Maintenance

   c) Schema Definition   d) Authorization of data access

13) Which of the join operations do not preserve non matched tuples ?

   a) Left outer join   b) Right outer join

   c) Inner join   d) Natural join

14) The variables in the triggers are declared using

   a) -   b) @   c) /   d) /@

2. Solve **any seven** of the following : **14**

    1) What is attribute ?

    2) Write types of view with its example.

    3) Explain DDL command.

    4) What is cursor ?

    5) What is trigger ?

    6) State any two aggregate function used in SQL.

    7) Explain alter command.

    8) Write different data types in SQL.

    9) What is tuple ?

3. A) Answer **any two** of the following : **10**

    1) Explain classification of SQL command.

    2) Explain block structure of PL/SQL, with example.

    3) Write PL/SQL block to test gives number is Armstrong or not.

    B) What is DBA ? Explain its function. **4**

4. Answer **any two** of the following : **14**

    1) Explain loop statement with example.

    2) Write difference between procedure and function with example.

    3) Write PL/SQL block to display prime number upto 1 to 100.

5. Answer **any two** of the following : **14**

    1) Explain types of Cursor with example.

    2) What is join ? Explain its types.

    3) Create table emp(eid, ename, eadd, jdate, salary, job) solve following queries :

        a) To display emp in to who having maximum salary.

        b) To display ename, whose name starting with 's'.

        c) To display eid, ename, salary, from table emp whose job title as 'manager'.

        d) Change the employee name 'Rahul' to 'Suresh' from table emp.

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SLR-W – 31

B.Sc – II (Semester – III) Examination, 2016
PHYSICS (Paper – III) (New CGPA Pattern)
General Physics, Heat and Sound

Day and Date : Monday, 11-4-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions : i) **All** questions are **compulsory**.
ii) Figures to **right** indicate **full** marks.
iii) Draw **neat** diagram **whenever** necessary.
iv) **Use** of calculator or log **table** is **allowed**.

1. Choose and write a correct answer from given **four** alternatives.   **14**

   i) The scalar triple product $\vec{A} \cdot (\vec{B} \times \vec{C})$ represents volume of _____
      enclosed by the vectors $\vec{A}, \vec{B}$ and $\vec{C}$ as its edges.

      a) Parallelo piped   b) Triangle   c) Cube   d) Square

   ii) Curl of vector field is _____

      a) Vector   b) Scalar   c) Always zero   d) One

   iii) In general motion of gyroscope consist of _____

      a) Rotation   b) Rotation and Precession
      c) Only precession   d) Rotation, precession and nutation

   iv) Critical velocity is the minimum velocity at which the disc can roll along
       linear path with its plane _____

      a) Horizontal   b) Vertical
      c) Inclined at 30° vertical   d) Inclined at 60° with vertical

   v) In flat spiral spring, the plane of each spiral is _____ to the axis of the
      cylinder of spring.

      a) Perpendicular   b) Parallel   c) Inclined   d) Zero

vi) A beam fixed at one end and loaded at other end is known as _____

   a) Cantilever

   b) Loaded beam

   c) Column

   d) Centrally loaded beam

vii) If height of liquid in a rotation viscometer is increased the rotational torque will _____

   a) Increase

   b) Decrease

   c) Remain constant

   d) Zero

viii) The viscosities of two liquids may be compared with the help of

   a) Searle's viscometer

   b) Ostwald viscometer

   c) Rotation viscometer

   d) Rankine's method

ix) The unit of entropy is _____

   a) Joule/K

   b) K/Joule

   c) Joule

   d) Erg

x) A piece of ice added to water then entropy is _____

   a) Increased

   b) Decreased

   c) No change

   d) Constant

xi) Decay of sound energy in the hall is _____

   a) Constant

   b) Linear

   c) Exponential

   d) Zero

xii) Ultrasonic can be heard by _____

   a) Man

   b) Women

   c) Bat

   d) All of these

xiii) The coefficient of absorption of an open window is _____

   a) Zero

   b) One half

   c) Infinity

   d) One

xiv) The gradient of scalar function is _____ rate of change of the function in space.

   a) Minimum

   b) Slow

   c) maximum

   d) Constant

2. Attempt **any seven** of the following :   **14**

   i) Define scalar triple product.

   ii) What is precessional motion ?

   iii) State any two applications of gyroscopic motion.

iv) What is del operator ?

v) What is flat spiral spring ?

vi) Define coefficient of viscosity.

vii) What is T-S diagram ?

viii) What is transducer ?

ix) Write any two properties of ultrasonic waves.

3. A) Attempt **any two** of the following : **10**

   i) What is curl of a vector ? Explain the physical significance of the curl of vector field.

   ii) What is cantilever ? Obtain an expression for depression of free end of a cantilever.

   iii) What are the requirement of good acoustics ?

   B) If $\vec{A} = 2x^3 y\hat{i} + 3yz\hat{j} + x^2 y^2 z^2 \hat{k}$. Find curl $\vec{A}$ at a point (1, −1, 0). **4**

4. Attempt **any two** of the following : **14**

   i) Define divergence of vector field and give physical significance of divergence of vector field.

   ii) Obtain expression for angle of lean of the rolling disc and velocity of disc.

   iii) Obtain expression of Young's modulus of material of wire of flat spiral spring.

5. Attempt **any two** of the following : **14**

   i) Derive the expression for coefficient of viscosity with the help of rotating cylinder method.

   ii) Define entropy. Derive an expression for the entropy of perfect gas in terms of temperature and pressure.

   iii) What is pressure microphone ? Explain construction and working of carbon microphone.

_____

Seat No.

B.Sc. (Part – II) (Semester – III) (New – CGPA) Examination, 2016
BIOCHEMISTRY (Paper – I)
Biomolecules

Day and Date : Monday, 11-4-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : i) **All** questions are **compulsory**.
　　　　　　　ii) Write chemical reactions where involved.
　　　　　　　iii) Figures to the right indicate maximum marks.

1. Write following sentences by selecting most correct answer from the following :   **14**

　i) _____ is a disaccharide.
　　a) Galactose　　　b) Fructose　　　c) Sucrose　　　d) Glyceraldehyde

　ii) Vitamin B1 is also called as
　　a) Riboflavin　　　b) Thiamine　　　c) Pyridoxine　　　d) Niacin

　iii) Terpenes with _____ number of carbon atoms are called monoterpens.
　　a) 5　　　　　b) 10　　　　　c) 15　　　　　d) 20

　iv) _____ is not a fibrous protein.
　　a) Collagen　　　b) Elastin　　　c) Keratin　　　d) Phosphoprotein

　v) Terpenes are the lipids derived from
　　a) Isoprenes　　　b) Waxes　　　c) Phospholipids　d) Sterols

　vi) _____ is an aromatic amino acid.
　　a) Glutamic acid　　b) Glycine　　　c) Tyrosine　　　d) Methionine

　vii) Vitamin A structure contains _____ double bonds.
　　a) 5　　　　　b) 4　　　　　c) 3　　　　　d) 6

　viii) _____ is a ketose sugar.
　　a) Glucose　　　b) Fructose　　　c) Lactose　　　d) Ribose

　ix) Thiamine deficiency causes
　　a) Pellagra　　　　　　　　b) Burning feet
　　c) Night blindness　　　　　　d) Beriberi

　x) _____ is a fat soluble vitamin.
　　a) Pantothenic acid　　　　　b) Retinol
　　c) Niacin　　　　　　　　d) Pyridoxine

　xi) Galactose is a component of
　　a) Sucrose　　　b) Cellulose　　　c) Lactose　　　d) Amylose

P.T.O.

xii) Haloenzyme contains _____ plus coenzyme.
   a) Apoenzyme   b) Isoenzyme   c) Vitamin   d) Zymogen

xiii) Fructose is a
   a) Aldohexose   b) Ketohexose   c) Aldopentose   d) Ketopentose

xiv) The type of enzymes which specificity catalyse only one reaction is known as _____ specificity.
   a) Optical   b) Absolute   c) Geometric   d) Group

2. Attempt **any seven** of the following :   **14**
   i) Explain keratins and elastins.
   ii) What are deficiency disorders of niacin ?
   iii) Define the terms :
      a) Isoenzyme
      b) Unit of enzyme
   iv) Write two examples each of saturated fatty acids and unsaturated fatty acids.
   v) Write two differences between amylase and cellulose.
   vi) Draw structures of palmitic acid and lauric acid.
   vii) Draw the structures of pyridoxine and riboflavin.
   viii) What are enantiomers ? Explain with suitable examples.
   ix) Write one example each of aromatic amino acid and heterocyclic amino acid.

3. A) Attempt **any two** of the following :   **10**
      i) Explain lipid bilayer fluid mosaic model of plasma membrane.
      ii) Describe tertiary structure of protein.
      iii) Write note on factors affecting enzyme activity.
   B) What are the forces involved in stabilizing native structure of protein ?   **4**

4. Attempt **any two** of the following :   **14**
   i) What are carbohydrates ? Write the classification of carbohydrates.
   ii) Write structure, biochemical role, deficiency disorders of thiamine.
   iii) What are oligosaccharides ? Explain maltose, cellobiose, isomaltose, lactose and sucrose.

5. Attempt **any two** of the following :   **14**
   i) Write note on specific activity of the enzyme.
   ii) Explain in detail simple proteins with sub-classification.
   iii) Write note on classification of enzymes.

_____

Seat
No.

B.Sc. – II (Semester – III) Examination, 2016
PLANT PROTECTION (New CGPA Pattern)
Paper – I : Major Crops and Methods of Integrated Plant Protection

Day and Date : Monday, 11-4-2016　　　　　　　　　　Total Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions: 1) **All** questions are **compulsory**.
　　　　　　　　2) Draw neat and labeled diagrams **wherever** necessary.
　　　　　　　　3) Figures to the **right** indicate **full** marks.
　　　　　　　　4) **All** questions carry **equal** marks.

1. Select the correct answer and rewrite the sentences.　　　　　**(1×14 = 14)**

　　i) _____ sp. came to India along with wheat from America.
　　　a) *Parthenium*　　　b) *Striga*　　　c) *Cynadon*　　　d) *Argemone*

　　ii) Agents involved in biological control measures belong to phyllum _____
　　　a) Nematoda　　　b) Arthropoda　　c) Both a and b　　d) Pseudopoda

　　iii) Soil solarization is an examples of _____ method of plant protection.
　　　a) biological　　　　　　　　　　b) chemical
　　　c) physical　　　　　　　　　　　d) mechanical

　　iv) In netting and bagging, grapes are seriously distributed in fruiting stage by
　　　_____
　　　a) Crow　　　　b) Sparrow　　　c) Eagle　　　d) Parrot

　　v) Crop hygiene is a example of _____ method of plant protection.
　　　a) mechanical　　b) cultural　　　c) physical　　　d) biological

　　vi) Name of the species of brinjal plant is _____
　　　a) *hysterophorus*　　　　　　　b) *dactylon*
　　　c) *melanjana*　　　　　　　　　d) *indica*

　　vii) _____ has to tap root system.
　　　a) Maize　　　　b) Bajra　　　　c) Jowar　　　d) Gram

P.T.O.

viii) Sugarcane is originated in _____ India.
   a) North-East   b) North-West
   c) North-South   d) South-East

ix) Sunflower is an example of _____ crop.
   a) Pulse   b) Oil seed
   c) Vegetables   d) Floriculture

x) Gerbera is an example of _____ plant.
   a) Cereal   b) Oil seed   c) Floriculture   d) Fruit

xi) Cultivation season of wheat is _____
   a) spring   b) winter   c) summer   d) rainy

xii) Applications of Acaricides is _____ method of plant protection.
   a) physical   b) chemical   c) biological   d) cultural

xiii) Crop hygiene belongs to the _____ method of plant protection.
   a) chemical   b) physical   c) cultural   d) mechanical

xiv) Groundnut is known as _____ crop.
   a) pulse   b) oil seed   c) fruit   d) vegetable

2. Answer **any seven** of the following :   (7×2 = 14)

   i) What is introduction of plant ?

   ii) Give the morphology of cotton.

   iii) Write the economic importance of cabbage.

   iv) State the physical barriers.

   v) Give any four applications of inseticides.

   vi) Write the agronomical condition of Jowar.

   vii) What are trap crops ?

   viii) Define plant pathology.

   ix) Give the morphology of Gerbera.

3. A) Answer **any two** of the followings :   (2×5 = 10)

   i) Give the types of biofertilizers and their application.

   ii) Explain the morphology and uses of grapes.

   iii) Describe the cultural methods and uses of groundnut.

   B) Explain the sowing and planting dates of cultural methods.   **4**

4. Answer **any two** of the following : **(2×7 = 14)**

   i) Explain the physical methods of plant protection.

   ii) Give the morphology and uses of Tur.

   iii) Give the need of plant quarantine in India.

5. Attempt **any two** of the following : **(2×7 = 14)**

   i) Explain the biocontrol of pests, Physical methods.

   ii) State the types and applications of bactericides.

   iii) Explain the uses of sticky bands in plant protection.

_____

Seat No.

B.Sc. (Part – II) (Semester – III) Examination, 2016
PHYSICS (Paper – IV) (New) CGPA
Electronics

Day and Date : Tuesday, 12-4-2016   Max. Marks : 70

Time : 10.30 a.m. to 1.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) **Neat** diagrams must be drawn **wherever** necessary.
4) **Use** of log tables and calculator is **allowed**.

1. Select the correct alternative from the following :   **14**

   i) An amplifier circuit is employed with negative feedback then its frequency response curve shows _____ in bandwidth than the amplifier without feedback.

      a) increment   b) decrement   c) no change   d) fluctuations

   ii) A differential amplifier can amplify

      a) d.c. signals   b) a.c. signals

      c) both a.c. and d.c. signals   d) none of these

   iii) The phase shift due to single RC network in phase shift oscillator is

      a) 360°   b) 180°   c) 120°   d) 60°

   iv) Crystal oscillator works on

      a) Piezo-Electric effect   b) Inverse Piezo-Electric effect

      c) Magnetostriction effect   d) Magnetocaloric effect

   v) The frequency of oscillations in the tank circuit is given as f =

      a) $\dfrac{1}{2\pi\sqrt{LC}}$ b) $\dfrac{2\pi}{\sqrt{LC}}$

      c) $2\pi\sqrt{LC}$ d) $\dfrac{1}{2\pi}\sqrt{\dfrac{L}{C}}$

P.T.O.

vi) The relation between FET parameters namely, a.c. drain resistance (r_d), transconductance (g_m) and amplification factor (μ) is

   a) $\mu = \dfrac{r_d}{g_m}$

   b) $\mu = \dfrac{g_m}{r_d}$

   c) $\mu = r_d \times g_m$

   d) $g_m = r_d \times \mu$

vii) In UJT, $R_{B1} = 7\ K\Omega$, $R_{B2} = 5\ K\Omega$, then intrinsic stand off ratio (η) is

   a) 0.583   b) 1.4   c) 0.714   d) 0.41

viii) In UJT, voltage sweep generator, the frequency of sawtooth wave depends on

   a) external resistance R

   b) external capacitor C

   c) external resistance R and external capacitor C

   d) applied voltage

ix) The De Morgan's second theorem is given by the relation $\overline{A.B} =$

   a) $\overline{A} + \overline{B}$ b) $\overline{A + B}$ c) $A + B$ d) $\overline{A} . \overline{B}$

x) RS flip-flop can be set or reset when both inputs are

   a) high   b) low

   c) complement of each other   d) zero

xi) The logical circuit employed for the addition of three binary bits is

   a) flip-flop   b) counter

   c) half adder   d) full adder

xii) IC 7906 is _____ volt regulator.

   a) 9   b) – 9   c) – 6   d) 15

xiii) _____ diode is usually used in transistor voltage regulator.

   a) Ordinary   b) Zener

   c) Tunnel   d) Photo

xiv) The time period (T) of a signal wave observed on CRO is 50 μs then the frequency of a signal will be

   a) 200 KHz   b) 2 KHz   c) 20 KHz   d) 20 MHz

2. Answer **any seven** of the following : **14**

   i) What is differential amplifier ? State its various modes of operation.

   ii) What is Barkhausen's criterion for sustained oscillation ?

   iii) What do you mean by AF and RF oscillators ? Give its example.

   iv) How the FET can acts as VVR ?

   v) What is the half adder ?

   vi) Draw the logic diagram of RS flip-flop using NOR gates.

   vii) What do you mean by fixed voltage regulator ? Give an example of IC based voltage regulator.

   viii) A power supply gives 20 V output for no load condition. Find the percentage of voltage regulation, if the full load voltage is 15 V.

   ix) What are the uses of digital multimeter ?

3. A) Answer **any two** of the following : **10**

   i) What is feedback in an amplifier ? Discuss positive and negative feedback in an amplifier.

   ii) Write note on UJT.

   iii) State and prove De Morgan's first theorem.

  B) The Hartly oscillator circuit has $L_1 = 2$ mH, $L_2 = 2$ mH, $M = 0.1$ mH and $C = 250$ pF. Find the frequency of an oscillator. **4**

4. Answer **any two** of the following : **14**

   i) Describe in detail two stage RC coupled amplifier. What are its advantages ?

   ii) Draw the neat circuit diagram of Colpitt's oscillator and explain its operation.

   iii) Explain the construction of FET. Discuss its characteristics.

5. Answer **any two** of the following : **14**

   i) What is a flip-flop ? Explain the construction and working of JK flip-flop.

   ii) Draw the neat circuit diagram of transistor series voltage regulator. Discuss its operation. Also explain the need of regulated power supply.

   iii) Draw the block diagram of CRO and explain the function of each block.

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Seat No.

B.Sc. (Part – II) (Semester – III) Examination, 2016
BIOCHEMISTRY (Paper – II) (New – CGPA)
Biochemical Techniques

Day and Date : Tuesday, 12-4-2016   Total Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Write **chemical** reactions **where** involved.
3) Figures to the **right** indicate **maximum** marks.

1. Write following sentences by selecting most correct answer from the following : **14**

    i) In colorimetric analysis when length of cuvette is constant, the absorbance changes according to _____
       a) Lambert's law   b) Beer's law
       c) Both a) and b)   d) None of these

   ii) The total volume of a column of gel is calculated by equation _____
       a) $V_T = V_0 + V_i - V_g$ b) $V_T = V_0 - V_i + V_g$
       c) $V_T = V_0 + V_i + V_g$ d) $V_T = V_0 - V_i - V_g$

  iii) In starch gel electrophoresis proteins are separated according to their _____
       a) Concentration of buffer   b) Charge and size
       c) Only charge   d) Only molecular weight

   iv) Lymphocytes from _____ sensitised mouse are used to produce hybridoma cells.
       a) Liver   b) Thymus
       c) Spleen   d) Bone marrow

    v) In spectrophotometer _____ converts light signal into electrical signal.
       a) Galvanometer   b) Diagonal mirror
       c) Photocell   d) Mercury lamp

P.T.O.

vi) In thin layer chromatography, glass is used as _____

   a) an adsorbent   b) a stationary phase

   c) a support   d) a binder

vii) Sephadex gel beads are prepared from _____

   a) acrylamide   b) starch gel

   c) agarase   d) dextran

viii) Diazo bonding method is prepared by treating aromatic amino group with _____in acidic medium.

   a) nitrate   b) nitrile

   c) nitrite   d) nitro

ix) ELISA technique is used to immobilise to detect presence of _____in small amounts.

   a) Antibodies   b) DNA   c) Lipoprotein   d) RNA

x) In electrophoresis, the effect of the electrophoresis can be minimised by _____

   a) applying low voltage

   b) applying high voltage

   c) passing more current

   d) increasing buffer concentration of electrolytes

xi) The logarithm of ratio of intensity of incident light to the intensity of transmitted light is called as _____

   a) absorbance   b) transmittance

   c) molar extinction coefficient   d) λ max

xii) – CONH type of covalent bond is formed during immobilization by _____ method.

   a) diazotisation   b) peptide binding

   c) physical adsorption   d) gel entrapment

xiii) Time period for patent for food, drug or medicine is _____ years from the date of sealing of patent.

   a) 5   b) 7   c) 10   d) 14

xiv) Saccharomyces cereviceae is used for production of _____ using immobilization technique.

   a) penicillin   b) ethanol   c) steroids   d) vitamins

2. Attempt **any seven** of the following : 14

   i) Define chromatography. Give the formula of R_f value.

   ii) How are proteins stained after starch gel electrophoresis ?

   iii) What is the use of PCR technique ?

   iv) What is trade mark ? Give two examples.

   v) Why guard column is used in HPLC ?

   vi) What is the effect of electric cloud on electrophoretic mobility ?

   vii) State and explain Beer's law.

   viii) What is the principle of column chromatography ?

   ix) Explain production of antibiotics.

3. A) Attempt **any two** of the following : 10

   i) What is the effect of ionic strength, pH and buffer on electrophoretic mobility ?

   ii) What are the limitations of colorimetric measurements ?

   iii) Explain any four applications of enzyme immobilisation.

  B) Draw a labelled block diagram of HPLC. 4

4. Attempt **any two** of the following : 14

   i) What is patent ? Discuss about patent and their registration.

   ii) State Beer-Lambert's law. Write note on spectrophotometer with diagram.

   iii) Explain starch gel electrophoresis and write its uses.

5. Attempt **any two** of the following : 14

   i) What is hybridoma ? Explain hybridoma technology.

   ii) What is covalent bonding to carriers ? Explain types of covalent bonding.

   iii) Which detectors are used in HPLC ? How do they function ? Write uses of HPLC.

SLR-W – 37

B.Sc. II (Semester – III) (New) (CGPA Pattern) Examination, 2016
STATISTICS (Paper – III)
Continuous Probability Distributions – I

Day and Date : Wednesday, 13-4-2016   Max. Marks : 70

Time : 10.30 a.m. to 1.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory*** *and carry* ***equal*** *marks.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Choose the correct alternative :   **14**

   1) For exponential distribution with p.d.f. $f(x) = \dfrac{1}{2} e^{-\frac{x}{2}} x \geq 0$ its mean and variance are

      a) (2, 4)   b) (1/2, 1/4)   c) (2, 1/4)   d) (1/2, 2)

   2) The joint p.d.f. of (X, Y) is

      $f(X, Y) = kXY$; $0 < X, Y < 1$

      $= 0$; otherwise

      Then the value of k is

      a) 4   b) 1/4   c) 8   d) 12

   3) If X is an exponential variate with parameter θ then
      a) mean = variance   b) mean = std. dev.
      c) mean > variance   d) mean = mode

   4) If $f(x) = \begin{cases} 1, & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$, is the p.d.f. of a r.v. X then P [X = 0.5] = _____

      a) 0.5   b) 1   c) 0   d) 0.25

5) A continuous r.v. X has distribution function $F(x) \begin{cases} 0; & x < 5 \\ 1 - \dfrac{25}{x^2}; & \text{otherwise} \end{cases}$,

then P [X> 10] is

a) 3/4　　　　　b) 1/25　　　　　c) 24/25　　　　　d) 1/4

6) Let F be the distribution function of a random variable X having p.d.f. $f(x) = 3x$

for $0 < x < (2/3)^{1/2}$. The value of F (1.5) is

a) 0　　　　　b) 1　　　　　c) 2/3　　　　　d) 0.5

7) E [Y|X = x] is the
a) function of x alone
b) function of y alone
c) both (a) and (b)
d) none of these

8) If X_1, X_2, X_3 are independent r.v.s with m.g. f's $M_1(t)$, $M_2(t)$ and $M_3(t)$ respectively; then m.g.f. of $X_1 + X_2 + X_3$ is
a) $M_1(t) . M_2(t) . M_3(t)$
b) $M_1(t) + M_2(t) + M_3(t)$
c) $M(t_1 + t_2 + t_3)$
d) $M(t_1, t_2, t_3)$

9) Let (X, Y) be a continuous bivariate r.v. with joint p.d.f.

$f(x, y) = \begin{cases} x + y & ; 0 < x < 1 \text{ and } 0 < y < 1 \\ 0 & ; \text{ otherwise} \end{cases}$ then the marginal p.d.f. of Y is

a) 2y – 1　　　　　b) 2y　　　　　c) 2y + 1　　　　　d) (2y + 1)/2

10) If X ~ U (a, b) then $\mu_2 = $ _____
a) $(b-a)^4/80$
b) $(b-a)^2/80$
c) $(b-a)^2/12$
d) $(a+b)/2$

11) For standard exponential distribution, m.g.f. is
a) $(1-t)^{-1}$
b) $(1+t)^{-1}$
c) $(1-t)$
d) $(1+t)$

12) If X ~ U (– a, a) such that P (|X| > 1) = 6/7 then value of a is
a) 7　　　　　b) 6　　　　　c) 14　　　　　d) 12

13) If $X \sim U\,(3, 8)$ then the distribution function of X at 5 i.e. F (5) is

    a) 5/11   b) 3/5   c) 2/5   d) 3/11

14) A r.v. X has m.g.f. $M_X\,(t) = (1 - 2t)^{-1}; t < 1/2$

    then the mean of X is

    a) 2   b) 1/2   c) 4   d) 1

2. Attempt **any seven :**   **14**

    a) Define continuous uniform distribution.

    b) Define mode of a continuous r.v.

    c) State the forgetfulness property of an exponential distribution.

    d) If $E\,(X|Y = y) = (1 + y)/2$ and $E\,(Y|X = x) = (1 + x)/2$ find Corr (X, Y).

    e) Define rth central moment of a continuous r.v.

    f) Define H.M. of a continuous r.v.

    g) Define exponential distribution.

    h) Define expectation of a function of a bivariate continuous r.v.

    i) Define conditional expectation of X given Y = y.

3. A) Attempt **any two :**   **10**

    a) A continuous r.v. X has p.d.f.

$$f(x) = 3x^2 \; ; \quad 0 < x < 1$$

$$= 0 \quad ; \quad \text{otherwise}$$

    find a and b such that

     i) $P(X \leq a) = P(X \geq a),$

     ii) $P\,(X > b) = 0.05$

    b) If X and Y are two r.v.s of continuous type, prove that
       $E\,[E(Y|X)] = E\,(Y)$

    c) If X is a r.v. with p.d.f. $f\,(x) = \theta e^{-\theta x} \quad ; x > 0, \theta > 0$

$$= 0 \quad ; \text{ otherwise}$$

    find the distribution of $Y = \theta X$.

B) Let X and Y be two continuous random variables, then show that **4**

$E(X + Y) = E(X) + E(Y)$.

4. Attempt **any two**: **14**

a) A continuous r.v. X has p.d.f.

$f(x) = (3/2)x^2; \quad -1 < x < 1$

$= 0 \quad ; \quad$ otherwise

Obtain probability distribution of $Y = |X|$.

b) If (X, Y) is a bivariate continuous r.v. with joint p.d.f.

$f(x, y) = x\,e^{-x(y+1)} \quad ; x > 0, y > 0$

$= 0 \quad ;$ otherwise

Obtain
 i) marginal p.d.fs of X and Y
 ii) are X and Y independent ?

c) Obtain three quartiles of exponential variate with parameter θ.

5. Attempt **any two**: **14**

a) If $X \sim U(1, 2)$, find mean of X and also find K such that $P[X > (K + \mu_1')] = 1/4$.

b) The joint p.d.f. of (X, Y) is

$f(x, y) = 21x^2 y^3 \quad ; 0 < x < y < 1$

$= 0 \quad ;$ otherwise

Find :
 i) conditional distribution of X given $Y = y$.
 ii) conditional mean of x given $Y = 0.5$.
 iii) conditional variance of X given $Y = 0.5$.

c) Define M.G.F. of a continuous r.v. and explain how to find r^{th} raw moment using it.

_____

Seat No.

B.Sc. II (Semester – III) Examination, 2016
METEOROLOGY Paper – I (New CGPA Pattern)
Climatology

Day and Date : Wednesday, 13-4-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Draw neat diagrams **wherever** necessary.
3) **Use** of stencils is **allowed**.

1. Choose the correct alternative :   **14**

   1) The _____ are the lines which are drawn on map to join the places of equal temperature.

   (Isohytes, Isobars, Isotherms, Isosaline)

   2) _____ is the science which studies atmosphere.

   (Climatology, Hydrology, Phytology, Pedology)

   3) The inter tropical convergence zone is also known as

   (sirocco, blizzards, doldrums, cells)

   4) Cold and dry winter air masses of _____ region are strong.

   (Pm, Pc, Em, Ec)

   5) Convergence of two _____ air masses is a prerequisite condition for frontogenesis.

   (similar, contrasting, equal, identical)

   6) An _____ is an immense body of air with uniform characters.

   (cloud, airmass, storm, anticyclone)

7) The term monsoon is derived from an _____ word.

(French, Greek, Spanish, Arabic)

8) Monsoon is a wind system of _____ regions.

(tropical, subtropical, polar, temperate)

9) Due to the south ward migration of the sun, the ITCZ is also shifted to

(north, east, south, west)

10) The 60° south latitude winds are called as _____ sixties.

(roaring, furious, screaming, running)

11) The cyclones are known as _____ in China.

(Hurricane, Storm, Tornado, Typhoon)

12) The secondary circulations are consist of

(trade winds, local winds, cyclones, breezes)

13) The lowest atmospheric pressure is recorded at _____ of a cyclone.

(centre, fringe, outer, inner)

14) Indian subcontinent receives nearly _____ percent of its annual rainfall by monsoonal winds.

(100%, 90%, 80%, 70%)

2. Write in short (**any 5**) : **15**

1) What is 'Meteorology' ?

2) Define a 'polar front'.

3) What is a 'typhoon' ?

4) State the types of planetary winds.

5) What is a 'maritime' airmass ?

6) State the elements of climate.

3. Write answers in short (**any 3**) :   **15**

   1) Describe the primary circulations.

   2) State the characters of tropical maritime airmasses.

   3) State the characters of tropical cyclones.

   4) Describe 'pressure' as an element of climate.

4. Answer **any 3** questions :   **15**

   1) Describe the types of airmasses.

   2) Explain the importance of local winds.

   3) Write in brief the scope of Meteorology.

   4) Explain the north east monsoon of India.

5. A) Answer **any one** question :   **6**

   1) Describe the vertical structure of atmosphere.

   2) State the patterns of tropical circulations.

   B) Answer **any one** question :   **5**

   1) Describe the origin of an anticyclone.

   2) Describe in brief the upper air circulations.

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Seat No.

B.Sc. – II (Semester – III) (New CGPA Pattern) Examination, 2016
GEOCHEMISTRY (Paper – I)
Introduction to Geochemistry

Day and Date : Wednesday, 13-4-2016　　　　　　　　　　　Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　2) Figures to the **right** indicate **full** marks.
　　　　　　　3) Draw **neat** diagrams **wherever** necessary.

1. Choose and write correct answer from given four alternatives : **14**

　　1) Water system is _____ component system.

　　　　a) zero　　　　b) one　　　　c) two　　　　d) three

　　2) If the co-ordination number of certain compound is four, its geometry is _____

　　　　a) linear　　　　　　　　b) tetrahedral

　　　　c) octahedral　　　　　　d) planner

　　3) In a crystal of NaCl, each sodium ion is surrounded by _____ chloride ions.

　　　　a) 4　　　　b) 6　　　　c) 8　　　　d) 10

　　4) Gibb's phase rule is

　　　　a) $P + F = C + 1$　　　　　b) $P + F = C + 2$

　　　　c) $P + F = C - 2$　　　　　d) $P - F = C + 2$

　　5) Cadmium sulphide show _____ bonding structure.

　　　　a) ionic　　　　　　　b) polar

　　　　c) covalent　　　　　d) none of these

　　6) The bond in a mineral shows _____ characteristics.

　　　　a) polar　　　　　　　b) electronegative

　　　　c) covalent　　　　　d) non polar

　　7) In a framework silicate structure, the ratio of Si : O is _____

　　　　a) 1 : 2　　　　b) 1 : 3　　　　c) 1 : 4　　　　d) 2 : 1

8) The _____ solution are mixed crystals.

   a) liquid   b) gaseous

   c) solid   d) none of these

9) In Ice $\rightleftharpoons$ water, the number of phases is _____

   a) 2   b) 3   c) 4   d) 1

10) If the co-ordination number of certain crystal is eight, its geometry is _____

   a) tetrahedral   b) bodycentre cubic

   c) octahedral   d) planer

11) The radius ratio of Na^+ ion to Cl^- ion in NaCl is _____

   a) 0.425   b) 0.625   c) 0.525   d) 0.125

12) The atomic substitution is _____ at higher temperature.

   a) same   b) lower

   c) not observed   d) higher

13) Sulphur rhombic convert into sulphur monoclinic, the process is called as _____

   a) melting   b) transition

   c) sublimation   d) vapourization

14) The degree of freedom at triple point in sulphur system is _____

   a) zero   b) one   c) two   d) three

2. Solve **any seven** of the following :   **14**

   1) Define polymorphism.

   2) Draw the structure of NaCl crystal.

   3) Define radius ratio.

   4) State and explain electronegativity.

   5) Draw the framework structure of silicate.

   6) Define :

     a) Phase

     b) Component.

   7) Define covalent bond. Give one example.

   8) Explain the term isomorphism.

   9) Define atomic substitution.

3. A) Attempt **any two** of the following : **10**

    1) Discuss the single chain structure of silicate.

    2) Define lattice energy. Give one example.

    3) State and explain Gibb's phase rule.

  B) Give the general rules of bond type. **4**

4. Attempt **any two** of the following : **14**

    1) Discuss water system with respect to Gibb's phase rule.

    2) Give the general rules of three dimensional structure with the help of solid geometry.

    3) Discuss the principles of crystal structure.

5. Attempt **any two** of the following : **14**

    1) Discuss sulphur system with respect to Gibb's phase rule.

    2) Write a short note on : The states of matter.

    3) State and explain Goldschmidt's mineralogical phase rule.

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Seat
No.

B.Sc. – II (Semester – III) (New C.G.P.A.) Examination, 2016
ZOOLOGY
Paper – III : Animal Diversity – III

Day and Date : Wednesday, 13-4-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Draw **neat**, labelled diagrams **wherever** necessary.
3) **All** questions carry **equal** marks.

1. Choose and write a correct answer from given **four** alternatives :   **14**

1) Water vascular system is a characteristic feature of phylum
   a) Mollusca   b) Arthropoda
   c) Echinodermata   d) Annelid

2) The chambers of heart in cockroach are
   a) 15   b) 13   c) 12   d) 14

3) Ctenidium of Pila is _____ organ.
   a) Locomotory   b) Reproductive
   c) Respiratory   d) Excretory

4) Mandibles are well developed and toothed in
   a) Sponging type   b) Biting and chewing type
   c) Piercing and sucking type   d) Siphoning type

5) In radula of pila _____ teeth are present in single row ?
   a) 7   b) 6   c) 5   d) 9

6) Upper lip of cockroach is called
   a) Mandible   b) Hypopharynx
   c) 1st maxilla   d) Labrum

7) Tornaria is the larval stage of
   a) Annelida   b) Arthropoda
   c) Mollusca   d) Hemichordata

8) Filaria is caused by

   a) Wuchereria bancrofti   b) Plasmodium vivax

   c) Plasmodium ovalis   d) Aedes aegypti

9) In cockroach number of ovariols are

   a) 3   b) 4   c) 16   d) 9

10) Byssus threads are present in

   a) Pila   b) Sepia   c) Mytilus   d) Unio

11) Vision in cockroach is

   a) Binocular   b) Monocular   c) Mosaic   d) Trinacular

12) Tactile function in Pila is

   a) Osphradium   b) Nuchal lobe   c) Tentacles   d) Statocyst

13) Glosa and paraglosa are the part of

   a) Antenna   b) Mandible   c) 2nd maxilla d) 1st maxilla

14) Anticoagulant secretion is essential for

   a) Piercing and sucking mouth parts

   b) Biting and chewing mouth parts

   c) Sponging mouth parts

   d) Siphoning mouth parts

2. Solve **any seven** of the following :   **14**

   1) Salivary gland of cockroach

   2) Shell of Pila

   3) Sexual dimorphism in cockroach

   4) General characters of phylum Echinodermata

   5) Foot in Sepia

   6) Osphradium of Pila

   7) Symptoms of dengue fever

   8) Economic importance of Pila

   9) Habit and habitat of cockroach.

3. A) Attempt **any two** of the following : **10**
   1) Digestive system of cockroach.
   2) Describe nervous system of Pila.
   3) Mouth parts of house fly.

   B) Describe foot in gastropoda. **4**

4. Attempt **any two** of the following : **14**
   1) Describe female reproductive system of cockroach.
   2) Describe digestive system of Pila.
   3) What is dengue ? Describe its treatment and control measure.

5. Attempt **any two** of the following : **14**
   1) Describe nervous system of cockroach.
   2) Affinities of hemichordata with annelid and echinodermata.
   3) Describe reproductive system of Pila.

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SLR-W – 41

B.Sc. – II (Semester – III) (New) (C.G.P.A. Pattern) Examination, 2016
STATISTICS (Paper – IV)
Discrete Probability Distributions and Statistical Methods

Day and Date : Saturday, 16-4-2016   Total Marks : 70
Time : 10.30 a.m to 1.00 p.m.

Instructions : i) **All** questions are **compulsory**.
ii) Figures to the **right** indicates **full** marks.

1. Choose the correct alternative :   **14**

   i) If X is a Poisson variate with P[X = 3] = P[X = 4], then the variance of a Poisson variate is
      a) 4   b) 2   c) 3   d) 5

   ii) If X and Y are two independent Poisson variates such that X ~ P(1) and Y ~ P(2) then P[X + Y < 3] is _____
      a) e^{-3} b) $3e^{-3}$
      c) $4e^{-3}$ d) $8.5e^{-3}$

   iii) A manufacturer produces switches and experiences that 2 percent switches are defective. The probability that in a box of 50 switches, there are at most two defective is
      a) $2.5e^{-1}$ b) e^{-1} c) $2e^{-1}$ d) $\dfrac{e^{-1}}{2}$

   iv) If X is a geometric r.v. then $P\left[X \geq 5 \middle/ X \geq 2 \right]$ is equal to

      a) $P[X \geq 5]P[X \geq 2]$ b) $P[X \geq 5]$
      c) $P[X \geq 5]/P[X \geq 3]$ d) $P[X \geq 3]$

   v) Negative binomial distribution NB(r, p) reduces to geometric distribution when r equal to
      a) 0   b) 1   c) ∞ d) None of these

vi) if X ~ Geo(0.6), then the variance of waiting time distribution is

a) $\dfrac{10}{6}$

b) $\dfrac{10}{4}$

c) $\dfrac{10}{9}$

d) $\dfrac{3}{2}$

vii) Let (X_1, X_2, X_3, X_4) be a random vector follows multinomial distribution with usual notations, then $E(X_3)$ is

a) $4P_3$

b) $4P_3(1 – P_3)$

c) P_1P_3

d) nP_3

viii) In the usual notations, $r_{21.3}$ is equal to

a) $\dfrac{r_{12}^2 - r_{13}r_{23}}{\sqrt{\left(1 - r_{13}^2\right)\left(1 - r_{23}^2\right)}}$

b) $\dfrac{r_{13}r_{23} - r_{12}^2}{\sqrt{\left(1 - r_{13}^2\right)\left(1 - r_{23}^2\right)}}$

c) $\dfrac{r_{12} - r_{13}r_{23}}{\sqrt{\left(1 - r_{13}^2\right)\left(1 - r_{23}^2\right)}}$

d) $\dfrac{r_{13} - r_{12}}{\sqrt{\left(1 - r_{13}^2\right)\left(1 - r_{12}^2\right)}}$

ix) The order of residual $X_{2.13}$ is

a) One

b) Two

c) Three

d) Four

x) The range of partial regression coefficient is

a) 0 to 1

b) –1 to 1

c) 0 to ∞

d) −∞ to ∞

xi) With usual notations, the regression equation X_2 on X_1 and X_3 is

    a) $X_2 = b_{12.3}X_1 + b_{32.1}X_3$

    b) $X_2 = b_{21.3}X_1 + b_{23.1}X_3$

    c) $X_2 = b_{12.3}X_3 + b_{32.1}X_1$

    d) $X_2 = b_{12.3}^2 X_1 + b_{23.1}^2 X_3$

xii) If $R_{1.23} = 0$, then

    a) $r_{12} = r_{13} = 0$ b) $r_{23} = 0$

    c) $r_{12} = 0, r_{13} \neq 0$ d) $r_{12} = r_{13} = r_{23} \neq 0$

xiii) If $R_{2.13} = 0$, then all total and partial correlation coefficients involving X_2 are

    a) 1   b) 0

    c) –1   d) $\dfrac{1}{2}$

xiv) In usual notations

    a) $b_{12.3} + b_{21.3} = r_{12.3}$

    b) $b_{12.3} \times b_{21.3} = r_{12.3}$

    c) $b_{12.3} \times b_{12.3} = r_{12.3}$

    d) $b_{12.3} \times b_{21.3} = r_{12.3}^2$

2. Attempt **any seven** of the following   **14**

   i) Define Poisson distribution, state its mean and variance.

   ii) Let X be geometric variate with parameter p, then show that $P[X \geq x] = (1-p)^x$.

   iii) Define multinomial distribution.

   iv) Obtain the probability generating function of waiting time distribution.

   v) State the two properties of residual.

   vi) If $r_{12} = r_{13} = r_{23} = r \neq 1$, then show that $R_{1.23}^2 = \dfrac{2r^2}{(1+r)}$.

   vii) Define the residual $X_{1.23}$ and state its mean.

   viii) If $r_{13.2} = 0$, then prove that $r_{12.3} = r_{12}\sqrt{\dfrac{1-r_{23}^2}{1-r_{13}^2}}$.

   ix) If $r_{12} = r_{13} = r_{23} = r \neq 1$, then show $r_{12.3} = \dfrac{r}{1+r}$.

3. A) Attempt **any two** of the following : **10**

   i) Define negative binomial distribution with parameters r and p. Find its mean and variance.

   ii) If X and Y are independent Poisson variates with means 2 and 4 respectively, then find

   a) $P\left(\dfrac{X+Y}{2} < 1\right)$

   b) $P\left(3(X + Y) \geq 9\right)$

   iii) Prove that the necessary and sufficient condition for the three regression planes to coincide is $r_{12}^2 + r_{13}^2 + r_{23}^2 - 2r_{12}r_{13}r_{23} = 1$.

   B) With usual notations, prove that $b_{12.3} \times b_{23.1} \times b_{31.2} = r_{12.3} \times r_{23.1} \times r_{31.2}$. **4**

4. Attempt **any two** of the following **14**

   i) Derive Poisson distribution as a limiting case of a binomial distribution.

   ii) Define the residual of variable X_1 with respect X_2 and X_3 and obtain its variance in terms of simple correlation coefficient.

   iii) Define multiple correlation coefficient $R_{1.23}$ and obtain an expression for $R_{1.23}$ in terms of simple correlation coefficients.

5. Attempt **any two** of the following **14**

   i) Define Geometric distribution with parameter p and obtain its mean, variance and distribution function.

   ii) Obtain probability generating function of the Poisson distribution, Hence or otherwise find mean and variance.

   iii) Define partial correlation coefficient. If the relation $aX_1 + bX_2 + cX_3 = 0$ holds for all sets of values X_1, X_2 and X_3 find $r_{12.3}$.

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Seat No.

B.Sc. – II (Semester – III) (CGPA Pattern) (New) Examination, 2016
METEOROLOGY
Paper – II : General Meteorology

Day and Date : Saturday, 16-4-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions :   i) **All** questions are **compulsory**.
                        ii) Figures to the **right** indicate **full** marks.
                       iii) **Draw** neat diagrams **wherever** necessary.

1. Choose and write a correct answer from given alternatives.   **14**

   i) The Earth's radiations lie in the _____ region.
      a) micro wave   b) UV   c) visible   d) IR

   ii) By Rayleigh's law of scattering the intensity of scattered light is inversely proportional to _____ power of wavelength of light.
      a) Fourth   b) Fifth   c) Sixth   d) Eighth

   iii) Red appearance of sun at sunrise and sunset is due to
      a) scattering of sunlight   b) diffused reflection of sunlight
      c) absorption of sunlight   d) refraction of sunlight

   iv) In adiabatic process _____ remains constant.
      a) temperature   b) pressure   c) entropy   d) volume

   v) The 'tephigram' is generally called as _____ diagram.
      a) T – T   b) T – ϕ c) $\phi - \phi$ d) T – V

   vi) Ozone concentration is measured in
      a) Dobson units   b) Doppler units c) Decibels   d) Thomson units

   vii) A line on map joining places of equal pressure is known as
      a) Isobars   b) Isotherms   c) Isentropic   d) Isotach

viii) The inertial frame of reference is _____ frame of reference.

    a) an accelerated　　　　　　　　b) un-accelerated

    c) a rotating　　　　　　　　　　d) constant

ix) Centrifugal force is given by F = ...

    a) $-mr\omega^2$　　　b) $-2m\omega V \sin\phi$　　　c) $-2m\left(\vec{\omega}\times\vec{V}\right)$　　　d) $-\dfrac{1}{\rho}\dfrac{dp}{dl}$

x) The man made satellite which have been launched in orbit round the earth is known as _____ satellite.

    a) Natural　　　　　　　　　　b) Artificial

    c) Natural or Artificial　　　　　d) None of the above

xi) Period of geo-synchronous satellite is equal to _____ hour.

    a) 3　　　　　b) 6　　　　　c) 12　　　　　d) 24

xii) A photovoltaic cell converts solar energy into _____ energy.

    a) Mechanical　　b) Thermal　　c) Electrical　　d) Kinetic

xiii) _____ nuclei are necessary for the formation of water droplets.

    a) Evaporation　　b) Central　　c) Condensation　　d) Peripheral

xiv) For the formation of water droplets _____ nuclei are necessary.

    a) hygroscopic　　b) central　　c) evaporation　　d) peripheral

2. Solve **any seven** of the followings :　　　　　　　　　　　**14**

   i) What is a solar cell ?

   ii) Explain in short 'Tephigram'.

   iii) What are properties of radiations ?

   iv) Mention effects of scattering of sunlight.

   v) Mention effects of Coriolis force in nature.

   vi) Write photochemical reactions of ozone formation.

   vii) What is open circuit voltage (V_{oc}) of a solar cell ?

   viii) What is a condensation nucleus ?

   ix) What is a pseudo force ?

3. A) Attempt **any two** of the following : **10**

    i) Explain Collision theories.

    ii) Explain Rayleigh's scattering.

    iii) How is an ozone molecule broken and depletion of ozone layer in the stratosphere takes place ?

  B) What is a polar orbiting satellite ? **4**

4. Attempt **any two** of the following : **14**

    i) How do the local winds occur ? Explain Buys-Ballots law.

    ii) Explain terrestrial re-radiation. What is green house effect ?

    iii) Explain the formation of ozone in the stratosphere. What are the effects of depletion of ozone ?

5. Attempt **any two** of the following : **14**

    i) Explain launching of satellite.

    ii) Write a note on condensation nuclei.

    iii) Explain in detail earth's rotation and Coriolis force.

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Seat No.

B.Sc. – II (Semester – III) (New CGPA Pattern) Examination, 2016
GEOCHEMISTRY (Paper – II)
Introduction to Solar System and Geo-Spheres

Day and Date : Saturday, 16-4-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
               2) Figures to the **right** indicate **full** marks.
               3) **Draw** neat labelled diagrams **wherever** necessary.

1. Choose and write a correct answer from given four alternatives :   **14**

   1) _____ are involved in photosynthesis and balances each other.
     a) H_2O, CO_2 b) N_2, O_2 c) O_2, CO_2 d) N_2, O_3

   2) In the primeval atmosphere, at the first stage of its evolution _____ was major constituent.
     a) CH_4 b) N_2 c) O_2 d) CH_3

   3) _____ constituent is locked in sedimentary rocks and reduced in its content in the atmosphere.
     a) SO_2 b) H_2O c) CO_2 d) CH_4

   4) The upper most atmospheric layer is _____
     a) Troposphere   b) Stratosphere
     c) Mesosphere   d) Thermosphere

   5) The upper limit of stratosphere is called _____
     a) Tropopause   b) Stratopause
     c) Mesopause   d) Thermopause

   6) Sulphur compounds in the atmosphere are added due to combustion of _____
     a) Petrol   b) Trees
     c) Gaseous fuels   d) Coal

   7) The photochemical dissociation of water vapour in the upper atmosphere added _____ gas.
     a) O_2 b) H_2 c) CO_2 d) NH_3

8) The average salinity of sea water is _____ parts per thousand.

   a) 30   b) 35   c) 40   d) 41

9) The major gases 'insolution' content in sea water is _____

   a) O_2 and CO_2 b) CO_2 and N_2

   c) O_2 and N_2 d) O_2 and O_3

10) The groundwater passing through limestone and dolomitic area is rich in
    _____

   a) Ca and CO_2 b) Ca and Na

   c) Ca and Mn   d) Ca and Mg

11) When inflow of rivers and rainwater decreases, then the salinity of ocean
    _____

   a) Increases   b) Decreases

   c) Remain constant   d) None of these

12) In sea water composition _____

   a) Na > Mg > Ca   b) Na > Ca > Mg

   c) Ca > Mg > Na   d) Na < Mg < Ca

13) In the cosmic abundances, the elements show a rapid exponential decrease
    for elements of the _____ atomic numbers.

   a) Higher   b) Medium

   c) Lower   d) None of these

14) The Sun's major constituents are _____

   a) H and He   b) O_2 and N_2

   c) NH_3 and CO_2 d) All of these

2. Solve **any seven** of the following :   **14**

   1) What are the compositions of Sial and Sima ?

   2) What is composition of upper mantle ?

   3) What is average composition of the crust ?

   4) Alloys of which metals are found in most of the meteorites ?

5) What is composition of Cohenite ?

6) Names of variable constituents of atmosphere.

7) Pallasites and meso-siderites are types of which meteorite ?

8) Distinguish between compositions of oceanic and terrestrial waters.

9) What is pyrolite ?

3. A) Attempt **any two** of the following :   **10**

    1) Structure of atmosphere.

    2) Composition of primeval atmosphere.

    3) Gains and losses of the elements in the oceanic water.

  B) What is composition of crust ?   **4**

4. Attempt **any two** of the following :   **14**

    1) Describe in brief zonal structure of the earth.

    2) How primary differentiation of metals takes place ?

    3) Describe atmospheric addition and losses during geologic time.

5. Attempt **any two** of the following :   **14**

    1) Geochemical classification of the elements.

    2) Composition of the earth as a whole.

    3) Nature of solar system.

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SLR-W – 44

Seat
No.

B.Sc. (Part – II) (Semester – III) (CGPA) Examination, 2016
ZOOLOGY (Paper – IV) (New)
Cell Science, Genetics, Biological Chemistry and Economic Zoology

Day and Date : Saturday, 16-4-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** labelled diagrams **wherever** necessary.

1. Complete the sentence selecting appropriate answer.   **14**

   1) Crossing over occurs at _____ stage.
      a) Leptotene   b) Pachytene   c) Zygotene   d) Diplotene

   2) Incomplete linkage is found in
      a) Male Drosophila   b) Female Drosophila
      c) Both a) and b)   d) None of the above

   3) During meiosis chromosomal number
      a) remain constant   b) get doubled
      c) get triple   d) reduced to half

   4) Ratio of supplementary factor is
      a) 9 : 3 : 3 : 1   b) 9 : 7   c) 9 : 3 : 4   d) 9 : 6 : 1

   5) Sucrose is _____ sugar.
      a) Cane   b) Milk   c) Tea   d) Malt

   6) Lipids are formed from
      a) amino acids   b) fatty acids   c) glucose   d) fructose

   7) DNA contains _____ sugars.
      a) starch   b) glucose   c) deoxyribose   d) ribose

   8) Rearing of bees is called as
      a) Apiculture   b) Sericulture   c) Fish culture   d) Pearl culture

   9) Larva of silk-moth is known as
      a) Apodus   b) Oligopodus   c) Polypodus   d) Nymph

P.T.O.

10) _____ is prepared by rapid evaporation of water from milk with constant sterring.

    a) Butter   b) Curd   c) Ice-cream   d) Khoa

11) Ranikhet is common disease in

    a) Fishery   b) Poultry   c) Piggery   d) Sericulture

12) Jaffarabadi is breeds of

    a) Cow   b) Goat   c) Buffalo   d) Poultry

13) Which of the following is ornamental fish ?

    a) Gold fish   b) Scoliodon   c) Labio   d) Dog fish

14) Nerve cell is useful for

    a) Transport of excretory product   b) Transport of digestive products

    c) Transport of blood   d) Transport of impulses

2. Answer **any seven** of the following :   **14**

   i) Anaphase   ii) Muscle cell

   iii) Coupling   iv) Diasaccharides

   v) Nutritional value of fish   vi) Mulberry silk moth

   vii) Drone bee   viii) Buffalow breeds

   ix) Meat

3. A) Attempt **any two** of the following :   **10**

     i) Explain complementary interaction.

     ii) Describe complete linkage.

     iii) Give mechanism of crossing over.

  B) Explain larval stages of silk worm.   **4**

4. Attempt **any two** of the following :   **14**

   i) Give economic importance of apiculture.

   ii) Describe breeds of goat.

   iii) Explain housing of dairy animals.

5. Attempt **any two** of the following :   **14**

   i) Give the structure of DNA.

   ii) Explain mitosis-cell division.

   iii) Describe milk and milk product.

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Seat
No.

B.Sc. (Part – II) (Semester – III) (New C.G.P.A. Pattern) Examination, 2016
MATHEMATICS (Paper – III)
Differential Calculus

Day and Date : Monday, 18-4-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
              2) Figures to the **right** indicate **full** marks.

I. Choose and write a correct answer from given **four** alternatives :   **14**

1) The radius of curvature at any point (s, ψ) on the curve $s = 4a \sin \psi$ is

    a) $4a \cos \psi$ b) $4a \sin \psi$ c) $4a \sin 2\psi$ d) None of these

2) Radius of curvature for the curve $y = e^x$ at the point $(0, 1)$ is

    a) $2\sqrt{2}$ b) 0 c) $3\sqrt{2}$ d) None of these

3) The radius of curvature for the curve $y = 4 \sin x - \sin 2x$ at $x = \frac{\pi}{2}$ is

    a) $\dfrac{5\sqrt{5}}{4}$ b) $\dfrac{4\sqrt{4}}{5}$ c) $\dfrac{5}{4\sqrt{4}}$ d) None of these

4) $\dfrac{ds}{d\theta}$ for the polar curve $r = f(\theta)$ is

    a) $\sqrt{r^2 + \left(\dfrac{dr}{d\theta}\right)^2}$ b) $\sqrt{\left(\dfrac{dx}{d\theta}\right)^2 + \left(\dfrac{dy}{d\theta}\right)^2}$

    c) $\sqrt{r^2 + \dfrac{d\theta}{dr}}$ d) None of these

5) $\dfrac{ds}{dt}$ for the curve $x = a(\cos t + t\sin t)$, $y = (a \sin t - t \cos t)$ is

    a) $a \cos t$ b) at c) $a \sin t$ d) none of these

P.T.O.

6) If $x = r\cos\theta$, $y = r\sin\theta$ then $\dfrac{\partial(r,\theta)}{\partial(x,y)} =$

    a) x   b) y   c) r   d) $\dfrac{1}{r}$

7) If $x = u(1 + u)$, $y = v(1 + u)$ then $\dfrac{\partial(x,y)}{\partial(u,v)} =$

    a) u + v   b) 1 + u + v   c) 1 – u + v   d) 1 – u – v

8) If $u = x^2 - y^2$, $v = xy$ then $\dfrac{\partial(u,v)}{\partial(x,y)} =$

    a) $x^2 + y^2$ b) $2(x^2 + y^2)$ c) x + y   d) $2(x + y)$

9) $\dfrac{\partial(u,v)}{\partial(x,y)} \cdot \dfrac{\partial(x,y)}{\partial(r,t)} =$

    a) 1   b) $\dfrac{\partial(x,y)}{\partial(r,t)}$ c) $\dfrac{\partial(x,y)}{\partial(u,v)}$ d) $\dfrac{\partial(u,v)}{\partial(r,t)}$

10) If u, v are functions of x, y then Jacobian of u, v with respect to x, y is a determinant of order

    a) 4   b) 3   c) 2   d) n

11) A function f(x, y) has extreme value at (a, b) then

    a) $f_x(a, b) > 0$ b) $f_y(a, b) > 0$

    c) $f_x(a, b) = f_y(a, b) = 0$ d) None of these

12) The maximum value of $f(x) = \dfrac{x^3}{3} - 2x^2 + 3x + 1$ is

    a) $\dfrac{3}{7}$ b) $\dfrac{7}{3}$ c) 1   d) 7

13) The maximum value of sinx + cosx is

    a) 2   b) $\sqrt{2}$ c) 1   d) None of these

14) A function f(x, y) has an extreme value at (a, b) then

    a) $AC - B^2 > 0$ b) $B^2 - AC > 0$

    c) $AC - B^2 = 0$ d) None of these

II. Solve **any seven** from the following : **14**

1) Find $\dfrac{ds}{d\theta}$ for $r = a(1 + \cos\theta)$.

2) Define total curvature, average curvature and curvature.

3) Find ρ for $s = c \log [\sec \psi]$.

4) If $x = uv$ and $y = \dfrac{u}{v}$ find $\dfrac{\partial(x,y)}{\partial(u,v)}$.

5) Show that the functions $u = x + 2y + z$, $v = x - 2y + 3z$ and $w = 2xy - xz + 4yz - 2z^2$ are not independent.

6) If $x + y + z = u$, $y + z = uv$, $z = uvw$ then find $\dfrac{\partial(x,y,z)}{\partial(u,v,w)}$.

7) Find maximum and minimum values of a polynomial $2x^3 - 15x^2 + 36x + 10$.

8) Show that the maximum value of $\left(\dfrac{1}{x}\right)^x$ is e^{-1}.

9) Find extreme value of $x^2 + 2xy + 2y^2 + 2x + y$.

III. A) Attempt **any two** of the following : **10**

1) Find the minimum value of $x^2 + y^2 + z^2$ subject to the condition $x + 2y - 4z = 5$.

2) Show that curvature of a circle is constant.

3) If $u = \dfrac{yz}{x}$, $v = \dfrac{xz}{y}$ and $w = \dfrac{xy}{z}$ then find $\dfrac{\partial(u,v,w)}{\partial(x,y,z)}$.

B) If J be a Jacobian of u, v with respect to x, y and J′ be a Jacobian of x, y with respect to u, v then show that $J.J' = 1$. **4**

IV. Attempt **any two** from the following : **14**

1) Define the radius of curvature and obtain an expression for radius of curvature for the curve $r = f(\theta)$.

2) If ρ_1 and ρ_2 are radii of curvature at the extremities of two conjugative

diameters of an ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ then show that $\rho_1^{2/3} + \rho_2^{2/3} = \dfrac{a^2 + b^2}{(ab)^{2/3}}$.

3) Find extreme values of the function $f(x, y) = 2x^3 + xy^2 + 5x^2 + y^2$.

V. Attempt **any two** from the following : **14**

1) Discuss the Lagrange's method of undetermined multipliers to find the extreme values of $u = f(x, y, z)$ subject to the conditions $\phi_1(x, y, z) = 0$ and $\phi_2(x, y, z) = 0$.

2) If u, v, w are implicit functions of x, y, z i.e. $f_i(u, v, w, x, y, z) = 0$ for i = 1, 2, 3 then show that

$$\frac{\partial(u, v, w)}{\partial(x, y, z)} = (-1)^3 \left[\frac{\dfrac{\partial(f_1, f_2, f_3)}{\partial(x, y, z)}}{\dfrac{\partial(f_1, f_2, f_3)}{\partial(u, v, w)}} \right]$$

3) If ρ_1 and ρ_2 are the radii of curvature at the extremities of a focal chord of a

parabola $x = at^2$, $y = 2at$ then prove that $\rho_1^{-2/3} + \rho_2^{-2/3} = (2a)^{-2/3}$.

Seat No.

B.Sc. – II (Semester-III) Examination, 2016
BOTANY Paper – III (New CGPA)
Structural Botany and Taxonomy of Angiosperms

Day and Date : Monday, 18-4-2016   Total Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Draw **neat** labeled diagrams **wherever** necessary.
3) Figures to the **right** indicate **full** marks.

1. Choose and write a correct answer from given **four** alternatives.   **14**

1) Motor cells are found in the epidermis of _____ plants.

   a) gymnosperm   b) monocot   c) dicot   d) none of these

2) The parenchyma which contains air cavities are called as

   a) aerenchyma   b) sclerenchyma
   c) collenchyma   d) fibres

3) Multiple epidermis found in _____ plants.

   a) hydrophytic   b) mesophytic   c) xerophytic   d) epiphytic

4) Rubiaceous stomata is also known as _____ stomata.

   a) anomocytic   b) anisocytic   c) paracytic   d) diacytic

5) Hydathodes are found in _____ angiospermic plants.

   a) herbaceous   b) thorny   c) woody   d) all

6) In square stem the mechanical tissues are present at

   a) center   b) corners   c) lateral side   d) apex

7) On the basis of origin the meristems are classified into _____ groups.

   a) one   b) two   c) three   d) four

P.T.O.

8) The lateral meristem is responsible for increase in

   a) height   b) width   c) both   d) none of these

9) The Tunica Corpus theory was proposed by

   a) Hofmeister   b) Nageli   c) Hanstein   d) Schmidt

10) Open vascular bundles are present in

   a) monocot root b) dicot root   c) monocot stem   d) dicot stem

11) Tracheids are found in

   a) meristem   b) phloem   c) xylem   d) parenchyma

12) The phelloderm is also known as

   a) cork cells   b) secondary cortex

   c) non vascular cambium   d) none of these

13) In the monocotyledone the anomalous secondary growth is found in
    _____ stem.

   a) *Dracaena*   b) *Bignonia*   c) *Nerium*   d) Maize

14) *Amaranthus spinosus* belongs to family

   a) combretaceae b) asclepidacee c) amranthaceae   d) liliaceae

2. Solve **any seven** of the following.   **14**

   i) Give the functions of chlorenchyma.

   ii) Sketch and define Osteroclereids.

   iii) Give the functions of stomata.

   iv) Sketch and define Latex Cells.

   v) Give the characteristic features of permanent cells.

   vi) Give the functions of Xylem.

   vii) Describe the Duramen.

   viii) Give the reason behind anomalous growth of root.

   ix) What are pollinia ?

3. A) Answer **any two** of the following. **10**

    i) Describe the difference between tracheids and vessels of xylem.

    ii) Describe the mechanical tissues in square stem.

    iii) Classification of meristem based on functions.

  B) Mention economic importance of family liliaceae. **4**

4. Attempt **any two** of the following. **14**

    i) Describe the different types of Trichomes.

    ii) Define the mertistematic tissues and give its functions.

    iii) Describe the internal primary structure with reference to tissues and functions in monocotyledonous stem.

5. Attempt **any two of** the following. **14**

    i) Describe anomalous sencodary growth in *Bigninia* stem and mention the anomalies found in it.

    ii) Describe normal secondary growth in dicotyledone stem.

    iii) Give the distinguishing characters of any one of following family and mention two plants of economic importance from family with their uses.

      a) Amaranthaceae   b) Combretaceae

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Seat
No.

B.Sc. – II (Semester – III) (New – CGPA) Examination, 2016
MATHEMATICS (Paper – IV)
Real Analysis

Day and Date : Wednesday, 20-4-2016   Max. Marks : 70

Time : 10.30 a.m. to 1.00 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Choose and write a correct answer from given **four** alternatives.   **14**

   1) If a, b ∈ R and a < c for each c > b then
      a) a < b   b) b < a   c) a = b   d) a ≤ b

   2) If x is real then $|x|$ =
      a) max {x, – x}   b) min {x, – x}
      c) both (a) and (b)   d) none of these

   3) For any two elements a, b ∈ S one and only one of the following is true, a > b, a = b, a < b this property is known as
      a) Law of trichotomy
      b) Transitivity
      c) Compatibility of order relation with addition
      d) Compatibility of order relation with multiplication

   4) Any non empty subset of real number which is bounded below has
      a) infimum   b) supremum
      c) both (a) and (b)   d) none of these

   5) The sequence of partial sums of a series with negative terms is
      a) monotonic decreasing   b) monotonic increasing
      c) both (a) and (b)   d) none of these

   6) $\lim_{n\to\infty}\left(1+\dfrac{1}{n}\right)^n$ lies between
      a) 0 and 1   b) 1 and 2   c) 2 and 3   d) – 1 and 1

7) Consider the following two statements.

   i) every bounded sequence is convergent

   ii) every convergent sequence is bounded

   a) only (i) is true   b) only (ii) is true

   c) both (i) and (ii) are true   d) both (i) and (ii) are false

8) Every bounded monotonic sequence is

   a) convergent   b) divergent

   c) both (a) and (b)   d) none

9) The sequence $\{(-1)^n\}$ is

   a) bounded above but not bounded below

   b) bounded below but not bounded above

   c) bounded

   d) unbounded

10) The series $\sum \dfrac{1}{n^p}$ converges for

   a) $p > 1$ b) $p < 1$ c) $p = 1$ d) None

11) A series obtained from a given convergent series by grouping of terms

   a) diverges   b) converges to same limit

   c) both converges and diverges   d) none of these

12) If Σu_n is a positive term series such that $\lim\limits_{n \to \infty} \dfrac{u_{n+1}}{u_n} = l$ then the series

   converges if

   a) $l > 1$ b) $l = 1$ c) $l < 1$ d) $l = \infty$

13) A convergent series of positive monotonic decreasing terms satisfies the condition

   a) $n^2 u_n \to 0$ b) $nu_n \to 0$ c) $u_n \to 0$ d) $u_n \to \infty$

14) If Σu_n is a positive term series such that $\lim\limits_{n \to \infty}\left(n \log \dfrac{u_n}{u_{n+1}}\right) = l$ then series

   diverges for

   a) $l > 1$ b) $l < 1$ c) $l = 1$ d) none of these

2. Solve **any seven** of the following : **14**

   1) Define the terms interval, open interval, closed interval.

   2) State the Dedekind's property.

   3) For all real numbers x, y show that $|x+y| \le |x| + |y|$.

   4) Show that $\lim\limits_{n\to\infty} \dfrac{3+2\sqrt{n}}{\sqrt{n}} = 2$.

   5) Show that an infinite series Σu_n is convergent then $\lim\limits_{n\to\infty} u_n = 0$.

   6) Show that the series $\dfrac{1}{2} + \dfrac{2}{3} + \dfrac{3}{4} + \dots$ is not convergent.

   7) If $\lim\limits_{n\to\infty} a_n = a$ and $a_n \ge 0 \; \forall n$ prove that $a \ge 0$.

   8) Test the convergence of the series $\Sigma \dfrac{1}{n^{1+\frac{1}{n}}}$.

   9) Define bounded and unbounded sequences.

3. A) Attempt **any two** of the following : **10**

   1) Show that there is no rational number whose square is 2.

   2) Show that the sequence $\{S_n\}$ where $S_n = \dfrac{1}{1!} + \dfrac{1}{2!} + \dfrac{1}{3!} + \dots + \dfrac{1}{n!} \; \forall n \in N$ is convergent.

   3) Show that the series $\dfrac{1}{(\log 2)^P} + \dfrac{1}{(\log 3)^P} + \dfrac{1}{(\log 4)^P} + \dots + \dfrac{1}{(\log n)^P} + \dots$ diverges for p > 0.

   B) Prove that every bounded sequence with unique limit point is convergent. **4**

4. Attempt **any two** of the following : **14**

   1) Prove that the set of rational numbers is not order complete.

   2) If $F = \{F_n\}$ is a countable class of non-empty closed and bounded sets such that $F_1 \supset F_2 \supset F_3 \ldots \supset F_n$ then prove that $\bigcap\limits_{n=1}^{\infty} F_n$ is non empty.

   3) State and prove D'Alembert's ratio test.

5. Attempt **any two** of the following : **14**

   1) State and prove Cauchy's root test.

   2) Prove that a necessary and sufficient condition for the convergence of a sequence $\{S_n\}$ is for each $\in > 0$ there exist a positive integer m such that $\left| S_{n+p} - S_n \right| < \in \; \forall n \geq m$ and $p \geq 1$.

   3) Show that $\sqrt{8}$ is not a rational number.

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SLR-W – 48

Seat No.	

B.Sc. – II (Semester – III) (New CGPA) Examination, 2016
BOTANY
Plant – Ecology (Paper – IV)

Day and Date : Wednesday, 20-4-2016　　　　　　　　Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

N. B. :　1) **All** questions are **compulsory**.
　　　　　2) **Draw** neat and labelled diagrams **wherever** necessary.
　　　　　3) Figures to the **right** indicate **full** marks.

1. Rewrite the sentence by choosing correct alternative :　　　　**14**

　　1) The total amount of water present in soil is called _____

　　　　a) Holard　　　　　　　　　b) Echard

　　　　c) Creshard　　　　　　　　d) Combined water

　　2) Green plant are

　　　　a) Secondary consumer

　　　　b) Primary consumer

　　　　c) Tertiary consumer

　　　　d) Producers

　　3) Energy flow is always

　　　　a) Unidirectional　　　　　　b) Multidirectional

　　　　c) Circular motion　　　　　d) All above

　　4) The plant succession which starts in aquatic environment is called

　　　　a) Xerosere　　　　　　　　b) Hydrosere

　　　　c) Halosere　　　　　　　　d) Psammosere

　　5) _____ are called shade loving plant.

　　　　a) Heliophytes　　　　　　　b) Scrophytes

　　　　c) Cryptophytes　　　　　　d) Xerophytes

　　6) Increasing concentration of _____ in air causes green house effect.

　　　　a) SO_2　　　　　　　　　　b) NO_2

　　　　c) CO_2　　　　　　　　　　d) O_2

P.T.O.

7) _____ stomata is character of Xerophytes.

    a) Sunken   b) Superficial

    c) Water   d) External

8) Phenology is _____ character of community.

    a) Qualitative

    b) Quantitative

    c) Natural

    d) Complex

9) Aloe is the example of

    a) Hydrophytes   b) Xerophytes

    c) Mesophytes   d) Epiphytes

10) The base of ecological pyramid of energy is always occupied by

    a) Primary consumers

    b) Secondary consumers

    c) Producers

    d) Decomposers

11) The _____ ecosystem show detritus types of food chain.

    a) Ponds   b) Mangrove

    c) Lakes   d) Grass land

12) _____ show poorly developed root system.

    a) Mesophytes

    b) Hydrophytes

    c) Xerophytes

    d) Epiphytes

13) _____ is a water pollutant.

    a) NO_2 b) Detergents

    c) SO_2 d) CO_2

14) The heliophytes are the plants which can tolerate and grow in

    a) Low intensity of light

    b) Full bright sunlight

    c) Under shade

    d) Dark

2. Solve **any seven** of the following : **14**

   1) Define density.
   2) Write fundamental character of community.
   3) Define primary and secondary succession.
   4) What are food chain ? Give the outline of detritus food chain.
   5) Define pollution and write any two sources of air pollution.
   6) What is qualitative character ? Write name of qualitative character of community.
   7) What is physiognomy ?
   8) Write sources of water pollution.
   9) What are hydrophytes ? State any two external adaptation of hydrophytes.

3. A) Attempt **any two** of the following : **10**
   1) Define succession. Write general processes of succession.
   2) What is life form ? Write brief account of phanerophytes.
   3) General characters of ecosystem.

   B) Describe food web with examples. **4**

4. Attempt **any two** of the following : **14**

   1) What is species diversity ? Explain α, β, γ diversity by giving suitable example.
   2) What is Biogeochemical cycles ? Explain oxygen cycle.
   3) Carrying capacity.

5. Attempt **any two** of the following : **14**
   1) Describe the morphological and physiological peculiarities in xerophytes.
   2) General characters of ecosystem.
   3) Define water pollution ? Write sources and effect of water pollution.

Seat No.

B.Sc. – II (Semester – III) (New-CGPA) Examination, 2016
ELECTRONICS (Paper – III)
Electronics Circuits

Day and Date : Thursday, 21-4-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
                    2) Draw the figures **wherever** necessary.
                    3) Figures to the **right** indicate **full** marks.
                    4) **Use** of calculator is **allowed**.

1. Choose and write a correct answer from given alternatives :   **14**

    i) The PIV of full wave rectifier is
       a) V_m b) $2V_m$

       c) $\dfrac{V_m}{2}$ d) $4 V_m$

    ii) Conversion of ac to dc is called as
        a) Rectification   b) Amplification
        c) Regulation   d) None of the above

    iii) Stability factor of CE amplifier is
         a) β b) 1
         c) $1 + \beta$ d) 2β

    iv) _____ bias is the most stable method of transistor biasing.
        a) Voltage-divider   b) Fixed
        c) Emitter   d) Collector to base

    v) The input impedance of _____ amplifier is highest.
       a) CE   b) CB
       c) CC   d) All of the above

    vi) In CB amplifier the current gain is
        a) Zero   b) Nearly equal to one
        c) Medium   d) High

vii) The current gain of Darlington amplifier is

     a) $\beta_1 + \beta_2$ b) $\beta_1 - \beta_2$ c) $\beta_1 \cdot \beta_2$ d) β_1 / β_2

viii) In multistage amplifier $A_1 = 10$, $A_2 = 5$. Overall voltage gain =
     a) 50   b) 15   c) 5   d) 2

ix) Gain of amplifier with feedback is given by $A_{vf} =$

     a) $A_v(1 + \beta A_v)$ b) $A_v(1 - \beta A_v)$ c) βA_v d) $\dfrac{A_v}{1 - \beta A_v}$

x) In Wein Bridge oscillator the RC network introduces _____ phase shift.
     a) 0°   b) 60°   c) 180°   d) 270°

xi) The efficiency of _____ power amplifier is maximum.
     a) Class-A   b) Class-B   c) Class-C   d) Class-AB

xii) _____ is an example of current series feedback.
     a) Emitter follower
     b) CE amplifier with emitter resistor
     c) CE amplifier with bypass capacitor
     d) None of these

xiii) Distortion in amplifier _____ with negative feedback.
     a) Increases   b) Remains same
     c) Decreases   d) None of these

xiv) Capacitor is tapped in _____ oscillator.
     a) Wein Bridge   b) Phase-shift   c) Hartley   d) Colpitt's

2. Attempt **any seven** of the following :   **14**

     i) Draw the circuit diagram of bridge rectifier.

     ii) Enlist different methods of transistor biasing.

     iii) Give important characteristics of CE amplifier.

     iv) What is cross-over distortion ?

     v) Draw circuit diagram of complementary symmetry amplifier.

     vi) What is multi-stage amplifier ? Give its different types.

     vii) What is the effect of negative feedback on gain and bandwidth ?

     viii) In an amplifier with negative feedback $A_v = 10$ and $\beta = -0.4$. Calculate gain with feedback.

     ix) Draw the circuit diagram of Hartley oscillator.

3. A) Attempt **any two** of the following : **10**
    i) Explain capacitor filter circuit.
    ii) Explain emitter bias circuit.
    iii) Explain direct coupled amplifier.

   B) Explain Zener regulator circuit. **4**

4. Attempt **any two** of the following : **14**
    i) Draw the equivalent circuit of CC amplifier. Derive the expression for A_i, A_v and R_i of CC amplifier.
    ii) Explain full wave rectifier with center-tapped transformer. Determine its efficiency.
    iii) What is power amplifier ? Explain Class-B push pull amplifier.

5. Attempt **any two** of the following : **14**
    i) Draw equivalent diagram of piezoelectric crystal. Explain crystal oscillator.
    ii) What are the types of negative feedback ? Explain current series feedback circuit. Obtain expression for gain of CE amplifier with emitter resistor.
    iii) Explain FET CS amplifier. Obtain expression for voltage gain.

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Seat
No.

B.Sc. (Part – II) (Semester – III) (New CGPA Pattern) Examination, 2016
GEOGRAPHY (Paper – III)
Biogeography – I

Day and Date : Thursday, 21-4-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions : 1) *All questions are compulsory.*
2) *Draw neat diagrams wherever necessary.*
3) *Use of stencils is allowed.*

1. Choose and write a correct from given **four** alternatives.   **14**

   1) The term _____ was firstly used by Tansley.

      (Ecosystem, Ecology, Environment, Ocytology)

   2) The planet earth along with air, land and water sustains life, known as

      (Hydrosphere, Atmosphere, Biosphere, Litosphere)

   3) The variations in the temperature affect the _____ in the air and also evapotranspiration.

      (Mist, Fog, Humidity, Water)

   4) Biogeography studies all _____ living things on the earth with respect to geographical relationship.

      (Abiotic, Biotic, Chemical, Mechanical)

   5) The functioning of an ecosystem depends upon the pattern of

      (Outgoing energy, Incoming energy, Energy flow, Receiving energy)

   6) Biogeochemical Cycle is a process of circulation of _____ within the biosphere.

      (Nutrients, Elements, Minerals, Water)

   7) _____ has written book entitled geography of livings thing.

      (Anderson, Taylor, Haggett, Semple)

8) Broadly speaking the world is divided into _____ major biomes.

(2, 3, 5, 7)

9) The term _____ is used to described the number variety and variability of living organism.

(Species diversity, Genetic diversity, Floral diversity, Biodiversity)

10) Von Humbolt is considered as father of _____ geography.

(Plant, Bio, Zoo, Soil)

11) The _____ of exploitation of forests is as old as man himself.

(Ecology, Geography, History, Geomorphology)

12) The _____ is the main source of heat and light energy for the environment.

(Galaxy, Sun, Star, Moon)

13) The inter linking of number of food chains form _____ in the given ecosystem.

(Food net, Cob web, Inter web, Food web)

14) _____ is an example of desert ecosystem.

(Sahara, Grassland, Marine, Pond)

2. Answer **any five** of the following. **15**

1) Define the term biogeography.

2) Nature of biogeography.

3) Nature the physical factor influencing biogeography.

4) Define the food chain.

5) Explain the term energy flow.

6) State the importance of Hot-Spot of biodiversity.

3. Answer **any three** of the following. **15**

1) Scope of biogeography.

2) Anthropogenic factors influencing biogeography.

3) State the laws of energy exchange.

4) State the concept of Ecosystem.

4. Answer **any three** of the following. **15**

1) Distinguish between environment and ecosystem.

2) Climatic factors influencing on biogeography.

3) State the concept of food web.

4) Discuss the characters of tropical ecosystem.

5. A) Answer **any one** of the following long answer question. **6**

1) Write the concept of an ecosystem.

2) Describe the types of biodiversity.

B) Answer **any one** of the following long answer question. **5**

1) State the nitrogen cycle in the biosphere.

2) State the concept of biodiversity conservation.

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Seat No.

B.Sc. – II (Semester – III) Examination, 2016
GEOLOGY (New)
Optics and Mineralogy (Paper – III) (CGPA Pattern)

Day and Date : Thursday, 21-4-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** labelled diagrams **wherever** necessary.

1. Choose and write a correct answer from given four alternatives :   **14**

   1) What is refractive index of Canada balsam ?
      a) 1.537   b) 1.516
      c) 1.658   d) 1.536

   2) Muscovite mineral shows _____ structure.
      a) Nesosilicate   b) Sorosilicate
      c) Inosilicate   d) Phylosilicate

   3) Orthoclase and microcline minerals are _____ of $KAISi_3O_8$.
      a) Pseudomorph   b) Polymorph
      c) Isomorph   d) None of these

   4) Which one of the following minerals shows simple twinning ?
      a) Plagioclase   b) Microcline
      c) Orthoclase   d) Garner

   5) _____ of the minerals can be measured by keeping cleavages parallel to cross wires and then rotation of the stage.
      a) Extinction angle   b) Birefringence
      c) Twinning   d) Twinkling

   6) The charge on SiO_4 tetrahedron is
      a) – 3   b) – 4
      c) – 5   d) – 6

P.T.O.

7) When the mineral remains black during complete rotation of stage under crossed nicols condition, then the mineral is said to be

   a) Isomorphic   b) Anisomorphic

   c) Isotropic   d) Anisotropic

8) Garnet occurs only in _____ type of rocks.

   a) Igneous   b) Sedimentary   c) Metamorphic d) Secondary

9) Cleavage angle in pyroxene is about _____ degrees.

   a) 45   b) 60   c) 90   d) 180

10) Biotite mica is dark in colour because of its _____ content.

   a) K and Al   b) Ca and Na   c) Al and Ca   d) Mg and Fe

11) Violet coloured variety of crystalline silica is

   a) Amethyst   b) Rock crystal c) Citrine   d) Rose quartz

12) Labradorite is member of

   a) K-felspar   b) Fels pathoid

   c) Plagioclase series   d) None of these

13) Which one of the following is Mg-carbonate ?

   a) Calcite   b) Magnesite   c) Aragonite   d) Siderite

14) Fibrous variety of tremolite is

   a) Asbestos   b) Chlorite   c) Gypsum   d) Actinolite

2. Solve **any seven** of the following :   **14**

1) What are differences between simple microscope and petrological microscope ?

2) What causes pleochroism ?

3) Which minerals have single refraction ?

4) What is lower nicol called as ?

5) Describe encrystation.

6) Names of crystalline silica minerals.

7) What is fayalite ?

8) Explain plagioclase series.

9) Names of carbonate minerals.

3. A) Attempt **any two** of the following : **10**

   1) Describe chlorite group of minerals.

   2) How felspathoid minerals are formed ? Describe physical, optical and chemical characteristics of members of this group.

   3) What are allumino-silicates ? Describe in brief members of this group.

   B) What is polymorphism ? Describe with examples. **4**

4. Attempt **any two** of the following : **14**

   1) What are minerals of pyroxene group ? Add a note on physical, chemical and optical properties of any five minerals.

   2) How polarization of light takes place in nicol's prism ?

   3) Describe in brief pleochroism with appropriate examples.

5. Attempt **any two** of the following : **14**

   1) Describe neso and soro-silicate structures.

   2) Describe lower assembly of petrological microscope.

   3) Why minerals show relief ? Explain types of relief with examples.

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Seat
No.

B.Sc. – II (Semester – III) (New CGPA) Examination, 2016
MICROBIOLOGY (Paper – III)
Cytology and Physiology of Microorganisms

Day and Date : Thursday, 21-4-2016　　　　　　　　　　　Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

N. B. :　i) **All** questions are **compulsory**.
　　　　　ii) Figures to the **right** indicate **full** marks.
　　　　　iii) **Draw** a neat labelled diagram **wherever** required.

1. Choose the correct answers from given alternatives :　　　　　　　**14**

　　1) Teichoic acid are _____ charged polymers.
　　　　a) Positive
　　　　b) Negative
　　　　c) Chargeless
　　　　d) Positive and Negative

　　2) In-peptidoglycan of gram negative bacteria at 3rd position of tetrapeptide _____ is present.
　　　　a) L-alanine　　　　　　　b) D-alanine
　　　　c) Meso-DAP　　　　　　 d) D glutamic acid

　　3) Fimbriae consists of at least _____ amino acids which occur in L-forms.
　　　　a) 160　　　　　　　　　　b) 100
　　　　c) 163　　　　　　　　　　d) 153

　　4) The magnetosomes contain chain of _____ particles.
　　　　a) Ferrite　　　　　　　　b) Nitrite
　　　　c) Magnetite　　　　　　　d) Sulfite

　　5) Peptidoglycan is absent in _____ organisms.
　　　　a) Halobacterium and Halococens
　　　　b) Lactobacillus
　　　　c) Corynebacterium
　　　　d) Gram positive bacteria

6) In _____ molecules move across the membrane along with concentration gradient without carrier molecule.
   a) Simple diffusion
   b) Facilitated diffusion
   c) Group translocation
   d) Active transport

7) The rigidity of spore cortex is due to pressure of
   a) Protein   b) Carbohydrates
   c) Peptidoglycan   d) Lipids

8) _____ are acellular in nature.
   a) Bacteria   b) Algae
   c) Viruses   d) Fungi

9) Plasmolysis takes place when cells are suspended in _____ solution.
   a) Hypotonic   b) Hypertonic
   c) Isotonic   d) Water

10) Diauxy was discovered by
   a) Watson and Cnck
   b) Lederberg
   c) Jacob and Monod
   d) Alexander

11) Enzymes are classified into _____ classes by enzyme commission.
   a) 2   b) 4
   c) 6   d) 8

12) Thymine dimer formation is due to
   a) High temperature   b) High salt concentration
   c) Heavy metals   d) U. V. light

13) _____ granules are more prominent in lactobacilli.
   a) Volutin   b) Lipid
   c) Sulfur   d) PHB

14) Final electron acceptor is aerobic respiration is
   a) CO_2 b) NH_3
   c) SO_4 d) O_2

2. Solve **any 7** of the following : **14**

    i) Halophiles.

    ii) Gas vacuoles.

    iii) Functions of pili.

    iv) Define oligodynamic action.

    v) Define lysogeny.

    vi) Structure of HIV.

    vii) Plasmolysis.

    viii) Group translocation.

    ix) Transferases.

3. A) Solve **any two** of the following : **10**

    i) Structure and function of peptidoglycan.

    ii) Diauxie growth.

    iii) Components of electron transport chain.

    B) Write on structure and functions of endospore. **4**

4. Attempt **any two** of the following : **14**

    i) Describe Homolactic and heterolactic fermentation.

    ii) Write on various methods of measurement of growth.

    iii) Explain lytic cycle of infection.

5. Attempt **any two** of the following : **14**

    i) Write in detail sporulation process.

    ii) Explain active transport.

    iii) Describe cell wall of gram negative bacteria.

Seat No.

B.Sc. – II (Semester – III) (New CGPA) Examination, 2016
ELECTRONICS
Paper – IV : Pulse and Switching Circuits

Day and Date : Friday, 22-4-2016

Time : 10.30 a.m. to 1.00 p.m.

Max. Marks : 70

Instructions : 1) **All** questions are **compulsory**.

2) Draw **neat** diagrams **wherever** necessary.

3) Figures to the **right** indicate **full** marks.

4) **Use** of log-table and calculator is allowed.

1. Select correct alternative from the following : **14**

1) If the input to a differentiating circuit is a triangular wave, then the output will be
   a) Square wave
   b) Rectangular wave
   c) Sawtooth wave
   d) None of the above

2) The clamper circuit is used to
   a) Introduce a d.c. level to a.c. signal
   b) Suppress variations in amplitude of the input signal
   c) Obtain an output which is integral of the input signal
   d) None of the above

3) IC 74121 can be used as
   a) Decoder
   b) Multiplexer
   c) Multivibrator
   d) Memory

4) The sweep speed of a simple circuit is given by
   a) $\dfrac{I}{C}$
   b) $I.\dfrac{t}{C}$
   c) $\dfrac{Ts}{RC}$
   d) $V.\dfrac{Ts}{RC}$

5) A transistor used as a switch is operated in
   a) Active region
   b) Cut off region
   c) Saturation region
   d) Cut off and saturation region

6) A bistable multivibrator
   a) has two stable states
   b) has two unstable states
   c) oscillates between two stable states without any trigger pulse
   d) is used for generating square wave

7) In monostable multivibrator using BJT the timing components are 47 KΩ and 0.01 μ F then the gate width obtained will be
   a) 32 μ sec.   b) 3.2 m sec.   c) 32 m sec.   d) 0.32 m sec.

8) As per functional block diagram of IC 555 _____ flipflop is used.
   a) D   b) JK   c) RS   d) All of the above

9) Pulse width of monostable multivibrator using IC 555 is given by

   a) W = 1.1 RC   b) W = 0.11 RC   c) W = 11RC   d) $W = \dfrac{1}{11\,RC}$

10) In astable multivibrator if the period of the wave is twice to that gate width the duty cycle is
    a) 100%   b) 75%   c) 50%   d) 25%

11) A capacitor of 100μ F is charged to 10V through resistance of 10 KΩ will be fully charged in _____ second.
    a) 5   b) 0.1
    c) 1   d) None of the above

12) In schmitt trigger circuit the UTP is + 3.5 V and LTP is +1.0 V, then the hysteresis voltage is
    a) 2V   b) 2.5 V   c) 3V   d) 4.5 V

13) The multivibrator that do not require external trigger for its operation is
    a) Astable multivibrator
    b) Monostable multivibrator
    c) Sawtooth
    d) All of the above

14) The transmission error is defined as difference between
    a) The input and output divided by the input
    b) The output and input divided by the input
    c) Input and output divided by the output
    d) Output and input divided by output

2. Solve **any seven** of the following (**2** marks **each**) : **14**

   1) Draw the circuit of positive clipper with input output waveforms.

   2) Define following terms with reference to a time base signal (a) sweep time (b) flyback time.

   3) What is non linear wave shaping ? Give one example.

   4) Define turn on and turn off time of a switching transistor.

   5) Draw circuit diagram of astable multivibrator using NAND gates.

   6) Draw circuit diagram of voltage controlled oscillator using IC 555.

   7) Show the input and output waveforms for schmitt trigger circuit when sine wave input is applied to it.

   8) In astable using IC 555, if T_{ON} is three times T_{OFF}. Obtain percent duty cycle.

   9) Draw the circuit diagram of monostable multivibrator using BJT.

3. A) Attempt **any two** of the following : **10**

   1) Show how an RC circuit can be used as integrator.

   2) Explain working of monostable multivibrator using IC 74121.

   3) Explain general features of time base signal.

   B) An IC 555 timer connected in astable mode of operation, for which $R_A = 6.8 \, K\Omega$, $R_B = 3.3 \, K\Omega$, $C = 0.1 \, \mu F$. Calculate output frequency and duty cycle of the circuit. **4**

4. Attempt **any two** of the following : **14**

   i) Explain working of bistable multivibrator using BJT with neat diagram.

   ii) Explain working of combination clipper with neat diagrams.

   iii) With neat diagram explain the working of UJT relaxation oscillator with constant current source.

5. Attempt **any two** of the following : **14**

   1) With neat labelled circuit diagram explain the working of Miller integrator.

   2) Using functional block diagram of IC 555 explain its operation as astable multivibrator.

   3) With neat diagram, explain working of a stable multivibrator using BJT. Draw the waveforms.

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Seat
No.

B.Sc. – II (Semester – III) (New) (CGPA Pattern) Examination, 2016
GEOGRAPHY (Paper – IV)
Soil Science – I

Day and Date : Friday, 22-4-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

N. B. :   1) **All** questions are **compulsory**.
             2) **Draw** neat diagrams **wherever** necessary.
             3) **Use** of stencils is **allowed**.

1. Choose and write a correct from given four alternatives :   **14**

    1) Soil are formed about the parent rock in due course of _____
       (Time, Tide, Wind, Rain)

    2) De composed organic material in the soil is called as _____
       (Soil solution, Soil particle, Humas, Sand)

    3) Texture of a soil determines _____ of the soil.
       (Porosity, Permeability, Acidity, Alkali content)

    4) Absence of soil air _____ supports plant growth.
       (Do, Does not, Frequently, Rarely)

    5) A typical soil horizon is developed in _____ climate.
       (Wet, Dry, Semi-acid, Moist)

    6) Black cotton soil is included in the group of _____ soils.
       (Verti sols, Histo sols, Ulti sols, Oxi sols)

    7) The process of laterisation is associated with _____ forests.
       (Polar, Temperate, Tropical, Semi-arid)

P.T.O.

8) _____ is one of the methods of soil conservation.

(Grazing, Forestry, Lumering, Talibunding)

9) Soil orders are classified on the basis of _____ major factors.

(2, 4, 6, 8)

10) Soil depth depends upon _____

(Age of the soil, Slope of the land, Bacterial Activities, Temperature of the area)

11) Which of the _____ soil does not develop in situ.

(Podzol, Laterite, Saline, Alluvial)

12) Porosity of the soil is a function of its _____

(Texture, Depth, Chemical composition, Colour)

13) _____ soils have well differentiated horizon resulting from a strong climatic and biological influences.

(Zonal, Azonal, Intrazonal, Transported)

14) In desert climates deposition of salts on the surface of the soil take place due to _____

(Transpiration, Evaporation, Illuviation, Condensation)

2. Answer **any five** of the following :   **15**

1) What is soil texture ?

2) What is soil pH ?

3) What is a pedocal ?

4) What is a soil horizon ?

5) What is soil erosion ?

6) Classify the soil according to colour.

3. Answer **any three** of the following : **15**

   1) Define the term soil.

   2) Explain biotic factors of soil formation.

   3) Describe the red soils.

   4) Discuss causes of soil degradation.

4. Answer **any three** of the following : **15**

   1) Describe the soil profile.

   2) Explain influence of climate on soil formation.

   3) Describe the estimation of soil erosion.

   4) Explain the role of check dams in soil conservation.

5. A) Answer **any one** of the following long answer question : **6**

   1) Explain the importance of soil as a resource.

   2) Write in brief the characteristics of Padzol soil.

   B) Answer **any one** of the following long answer question : **5**

   1) Explain the methods of soil conservation and management.

   2) Describe the causes of soil degradation.

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Seat No.

B.Sc.-II (Semester – III) (CGPA Pattern) Examination, 2016
GEOLOGY (Paper – IV) (New)
Structural Geology

Day and Date : Friday, 22-4-2016   Total Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
                      2) Draw **neat** diagrams **wherever** necessary.
                      3) Figures to the **right** indicate **full** marks.

1. Write a correct answer from given **four** alternatives :   **14**

   1) Limbs in the isoclinal fold are _____ to each other.
      a) parallel   b) perpendicular
      c) inclined   d) tangential

   2) In _____ folds deformation was sufficiently intense to cause flowage of mobile beds and form thick hinges and thin limbs.
      a) closed   b) open   c) chevron   d) monoclinic

   3) _____ joints in folded rocks are perpendicular to the axis of folds.
      a) Release   b) Extension   c) Strain-slip   d) Shear

   4) Offset of streams are found along _____ faults.
      a) Normal   b) Reverse   c) Graben   d) Strike-slip

   5) The rock block present above the fault plane is called _____
      a) Foot wall   b) Hanging wall   c) Heave   d) Throw

   6) Angle made by faults plane with vertical surface is called _____
      a) dip   b) throw   c) heave   d) hade

   7) Columnar joints are the result of _____ of Basic lava.
      a) Release   b) Cooling   c) Expansion   d) Shearing

P.T.O.

8) The outcrop pattern of plunging fold is _____
   a) zigzag　　　　b) linear　　　　c) parallel　　　　d) rectangular

9) The _____ are boundaries along which plates move towards each other.
   a) Convergent Boundaries　　　　b) Divergent Boundaries
   c) Transform Boundaries　　　　d) None of these

10) Over thrust is a reverse fault that dips less than _____ degree.
    a) 45　　　　b) 30　　　　c) 60　　　　d) 10

11) A series of faults that have the same strike and dip are called the _____
    a) Parallel faults　　　　b) Gravity faults
    c) Oblique slip fault　　　　d) Tension fault

12) _____ in which both limbs are overturned.
    a) Box fold　　　　b) Chevron fold
    c) Fan fold　　　　d) None of these

13) Rocks in the core of anticline fold are _____
    a) younger　　　　b) older　　　　c) a and b both　　　　d) none of these

14) An _____ is the area where the bed rock is exposed on the ground surface.
    a) outcrop　　　　b) landscape　　　　c) landform　　　　d) none of these

2. Solve **any seven** of the following : **14**

   1) Define unconformity.

   2) Strike.

   3) Define joints.

   4) Define fault.

   5) What is heave in fault ?

   6) Foot wall.

   7) Axis of fold.

   8) Throw of fault.

   9) Define lineation.

3. A) Attempt **any two** of the following : **10**

    1) Explain Horst and Graben fault.

    2) Explain Outliers and Inliers.

    3) Explain recumbent and chevron fold.

  B) How to determine width of outcrop ? **4**

4. Attempt **any two** of the following : **14**

    1) Explain criteria for the recognition fold in the field.

    2) Explain genetic classification of joints.

    3) Explain types of unconformities.

5. Attempt **any two** of the following : **14**

    1) Explain normal, reverse and step faults.

    2) Explain concept of plate tectonics.

    3) Explain recognition of unconformities in the field.

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Seat No.

B.Sc. – II (Semester – III) (New CGPA) Examination, 2016
MICROBIOLOGY (Paper No. – IV)
Bacterial Genetics

Day and Date : Friday, 22-4-2016　　　　　　　　　　Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

> ***Instructions*** : 1) *Figures to **right** indicate **full** marks.*
> 2) ***All*** *questions are **compulsory**.*
> 3) *Draw **neat** labelled diagrams **wherever** required.*

1. Rewrite the sentences after choosing correct answer from the given alternatives. **14**

　i) Z form of DNA consists of _____ loop per turn of helix.
　　a) 10　　　　　b) 11　　　　　c) 12　　　　　d) 9

　ii) _____ is small, soluble and adaptor RNA molecule.
　　a) t-RNA　　　b) r-RNA　　　c) m-RNA　　　d) Sn RNA

　iii) A minimal genetic unit capable to form functional product called
　　a) Recon　　　b) Intron　　　c) Mutan　　　d) Cistron

　iv) There are _____ codons which specify 20 amino acids.
　　a) 64　　　　　b) 61　　　　　c) 16　　　　　d) 20

　v) The observable properties of organism is called
　　a) Genome　　b) Genotype　　c) Phenotype　　d) Haplotype

　vi) Irradiation of DNA by UV radiation forms _____ diamers.
　　a) T = T　　　b) A = G　　　c) T = A　　　d) G $\equiv$ C

　vii) _____ is alkylating agent most commonly used in mutagenesis.
　　a) 5BU　　　　b) EMS　　　　c) HNO_2　　　d) U.V. light

　viii) Mutation in a codon specifying for one amino acid to codon specifying another functionally equivalent amino acid is called _____ mutation.
　　a) missense　　b) nonsense　　c) silent　　　d) neutral

　ix) The process of conjugation discovered by _____ and _____.
　　a) Lederberg, Tatum　　　　　b) Beadle, Tatum
　　c) Zinder, Leaderberg　　　　d) Watson, Crick

　x) _____ phage mediate generalised transduction.
　　a) ϕ 80　　　　b) P22　　　　c) λ　　　　d) T_4　　　**P.T.O.**

xi) _____ carry out unwinding of DNA during replication.
    a) Helicase   b) Primase   c) DNA-ligase   d) DNA polymerase

xii) The high copy number of plasmid is called _____ plasmid.
    a) Stringent   b) Degenerative   c) Relaxed   d) Virulent

xiii) The uptake and transfer of bacteriophage DNA into recipient cell is called
    a) Transfection   b) Transduction
    c) Transformation   d) Conjugation

xiv) _____ plays an important role in photoreactivation.
    a) Methylase   b) Exonuclease   c) Photolyase   d) Endonuclease

2. Answer in **one** or **two** sentences (**any seven**) :   **14**
   i) Define semiconservative replication.
   ii) Forms of DNA
   iii) Define gene and genome.
   iv) Draw a neat labelled diagram of cloverleaf model of t-RNA.
   v) Missense mutation.
   vi) T = T dimer.
   vii) Split genes.
   viii) Base analogue.
   ix) Exogenote.

3. A) Attempt **any two** of the following :   **10**
    i) Define 'Spontaneous mutation. Add a note on fluctuation test.
    ii) Describe in brief specialised transduction.
    iii) Discuss in brief rolling circle model of replication.

  B) What is genetic code ? Explain properties of genetic code.   **4**

4. Attempt **any two** of the following :   **14**
   i) Describe in detail of chemical nature and structure of B form of DNA.
   ii) Define Transformation. Describe in detail process of transformation.
   iii) Define plasmid. Describe in detail types of plasmid.

5. Attempt **any two** of the following :   **14**
   i) Define Replication. Describe in detail mechanism of semiconservative and rolling circle replication.
   ii) Define conjugation. Describe in detail process of conjugation.
   iii) Describe in detail dark excision repair.

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SLR-W – 59

B.Sc. – II (Semester – III) Examination, 2016
CHEMISTRY
Organic Chemistry (Paper – V) (Old)

Day and Date : Thursday, 7-4-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
           2) Draw ***neat*** *diagram and give equations* ***wherever*** *necessary.*
           3) Figures to the ***right*** *indicate* ***full*** *marks.*
           4) Use of log table or calculator is ***allowed****.*
           5) Atomic weight : H = 1, C = 12, N = 14, O = 16, Cl = 35.5,
              I = 127, Ag = 108.
           6) Spectroscopic chart is ***supplied****.*

1. Choose correct alternative from each of the following :   **10**

   i) Pinacol is the reduction product of
     a) Diethyl ketone
     b) Pinacolone
     c) Acetone
     d) Ethyl methyl ketone

   ii) When succinic acid heated above its m.p. gives
     a) succinaldehyde
     b) acetaldehyde
     c) succinic anhydride
     d) acetic anhydride

   iii) The wavelength range for uv region of the electromagnetic radiation is
     a) 100 – 400 nm   b) 400 – 800 nm
     c) above 800 nm   d) none of these

P.T.O.

iv) If the two first higher priority atoms or groups are on opposite side of double bond then the configuration is known as

    a) R   b) E

    c) S   d) Z

v) Methyl orange has _____ colour in alkaline solution.

    a) Orange   b) Pink

    c) Red   d) Yellow

vi) Malic acid on reduction with HI gives

    a) Malonic acid   b) Succinic acid

    c) Phthalic acid   d) Citric acid

vii) _____ and diazomethane in presence of HBF_4 forms anisole.

    a) Aniline   b) Toluene

    c) Benzene   d) Phenol

viii) Which type of electronic transitions requires least energy ?

    a) $\sigma \rightarrow \sigma^*$ b) $\pi \rightarrow \pi^*$

    c) $n \rightarrow \pi^*$ d) $n \rightarrow \sigma^*$

ix) In D and L nomenclature system the standard reference molecule taken as

    a) Lactic acid

    b) Glyceraldehyde

    c) Glycerol

    d) Acetaldehyde

x) Glycerol is present as a triester in

    a) Petroleum

    b) Kerosene oil

    c) Vegetable oils and fats

    d) Naphtha

2. Answer **any five** of the following : **10**

   i) What is diazotisation ? How will you prepare iodobenzene from benzene diazonium chloride ?

   ii) Write the structures of following :
      a) methyl phenyl ketone
      b) 2-methyl butanal

   iii) Define (a) Bathochromic shift (b) Hyperchromic shift.

   iv) Complete the following reactions :

      a) Oxirane $\xrightarrow{\text{C}_2\text{H}_5\text{OH}/\text{H}^+}$?

      b) Oxirane $\xrightarrow{\text{NH}_3}$?

   v) Write the method of preparation of benzene diazonium chloride.

   vi) Define
      a) Geometrical isomerism
      b) Conformational isomerism.

3. A) Answer **any two** of the following : **6**

   i) Calculate λ_{max} of the following compounds by using Woodward Fieser rule.
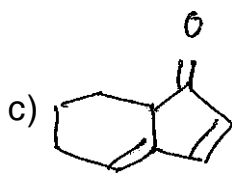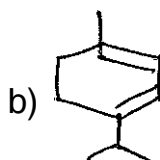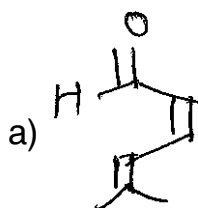
ii) Assign R and S nomenclature to the following compounds.

a) CH_2OH — H—C—NH_2 — CH_3

b) CH_3 — H—C—OH — OCH_3

c) CHO — H—C—C_6H_5 — NH_2
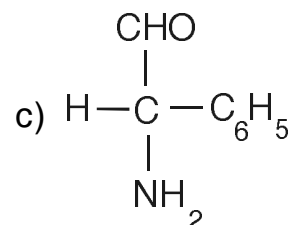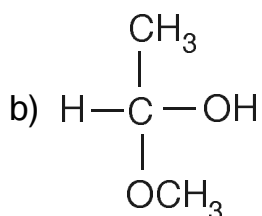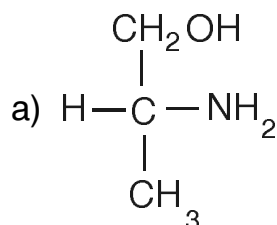
iii) How will you prepare phthalic acid from naphthalene ? Write uses of phthalic acid.

B) In Zeisel's estimation of methoxy group, 0.364×10^{-3} Kg of an organic compound having molecular weight 182 gave 0.940×10^{-3} Kg of AgI. Calculate the percentage and number of methoxy groups in the organic compound. **4**

4. Answer **any two** of the following : **10**

i) Explain the different types of electronic transitions involved in UV spectroscopy.

ii) How will you prepare monochloroacetic acid ? What is the action of (a) KI (b) KCN (c) Moist AgOH (d) $2NH_3$ on monochloro acetic acid ?

iii) Explain the reaction with mechanism of aldol condensation.

5. Answer **any two** of the following : **10**

i) Write any two methods of preparation of ethylene glycol. Write uses of ethylene glycol.

ii) Draw structures for different conformations of n-butane. Comment on their stability with potential energy diagram.

iii) Explain :
   a) Fries rearrangement
   b) Claisen rearrangement.

Spectroscopic Chart

Woodward's-Fieser's rules for calculating ultraviolet absorption maxima

A) For substituted dienes (Ethanol solution)

No.	Basic value	λ_{mas} (nm)
1)	Acyclic and heteroannular dienes	214
2)	Homoannular dienes	253
3)	Addition for each substituent	
	a) −R alkyl (including part of carbocyclic ring)	5
	b) −OR (alkoxy)	6
	c) −Cl, −Br	5
	d) −OCOR (acyloxy)	0
	e) −NR$_2$, (N-alkyl)	60
	f) −SR (S-alkyl)	30
	g) −CH = CH − additional conjugation i.e. extending conjugation	30
	h) If one double bond is exocyclic to one ring	5
	i) If excyclic to two rings simultaneously	10

B) Rules for α, β – Unsaturated Enones (Ethanol Solution)

No.	Basic value	λ_{max} (nm)
1)	Ketones : $-\overset{\beta}{C}=\overset{\alpha}{C}-CO-$	
	a) Acyclic or 6 – membered ring	215
	b) 5 – membered ring	202
2)	Aldehydes $-C=C-CHO$	207
3)	Extended Conjugation	30
	$-\overset{\delta}{C}=\overset{\gamma}{C}-\overset{\beta}{C}=\overset{\alpha}{C}-CO-$ etc.,	
4)	Homodiene component	39
5)	a) If one double bond is exocyclic to one ring	5
	b) If exocyclic to two rings simultaneously	10
6)	Addition for substituents	

Substituents   Position

		α	β	γ	δ
a)	–R alkyl (including part of carbocyclic ring)	10	12	18	18
b)	–OR (alkoxy)	35	30	17	31
c)	–OH (hydroxy)	35	30	–	50
d)	–SR (thioether)	–	85	–	–
e)	–Cl (chloro)	15	12	–	–
f)	–Br (bromo)	25	30	–	–
g)	–OCOR (acyloxy)	6	6	–	6
h)	$-NH_2$, –NHR, $-NR_2$	–	95	–	–

Solvent correction

	Solvent	
a)	Ethanol	0
b)	Methanol	0
c)	Dioxan	–5
d)	Chloroform	–1
e)	Ether	–7
f)	Water	+8
g)	Hexane	–11
h)	Cyclohexane	–11

_____

Seat
No.

B.Sc. – II (Semester – III) Examination, 2016
CHEMISTRY (Old)
Inorganic Chemistry (Paper – VI)

Day and Date : Saturday, 9-4-2016　　　　　　　　　Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Draw **neat** labeled diagram **wherever** necessary.
　　　　　　　　3) Figures to the **right** indicate **full** marks.

1. Select the most correct alternative for each of the following and rewrite the
   sentence :　　　　　　　　　　　　　　　　　　　　　　　　　　　　**10**

   1) In $[Co(NH_3)_6]Cl_3$, effective atomic number of Cobalt is _____

   　　a) 36　　　　　　b) 35　　　　　　c) 34　　　　　　d) 27

   2) Hardness of water determined by using standard solution of _____

   　　a) Oxalic acid　　b) Na_2EDTA　　c) DMG　　　　d) All of these

   3) Lithium ion (Li^+) is _____

   　　a) hard base　　b) soft acid　　c) hard acid　　d) soft base

   4) The _____ elements are act as bridge between s and p block elements.

   　　a) inner transition　　　　　　b) non-transition

   　　c) metallic　　　　　　　　　　d) transition

   5) The substances do not loss their identities in aqueous medium are generally
   _____

   　　a) salts　　　　　　　　　　　b) ionic compound

   　　c) complex salts　　　　　　　d) coordinate compound

   6) The chelating agents must be _____ ligands.

   　　a) monodentate　b) covalent　　c) polydentate　　d) acidic

7) The H^+ is called hard acid, whereas H^- is called _____

   a) soft acid   b) soft base   c) hard base   d) none of these

8) 4-d transition series start with atomic number _____ and ends with _____ atomic number.

   a) 21, 30   b) 39, 48   c) 21, 48   d) 57, 80

9) In the formation of NH_4^+, H^+ is act as _____

   a) Lewis acid   b) Lewis base   c) Donor   d) Chelating agent

10) _____ is selective and sensitive reagent for nickel.

   a) 8-Hydroxy quioline   b) Glycine

   c) EDTA   d) DMG

2. Solve **any five** of the following :   **10**

   1) Define complex salt with suitable example.

   2) State and explain term coordination number with example.

   3) Define chelation with example.

   4) Define acid and base according to Lewis concept, with example.

   5) As compare to 4d and 5d transition series elements 3d transition series elements are reactive, why ?

   6) Write the observed electronic configuration of chromium and copper.

3. A) Attempt **any two** of the following :   **6**

   1) Discuss the position of d-block elements in periodic table.

   2) What are the postulates of Werner theory ?

   3) 3-d block elements can easily forms complex, explain in brief.

  B) Write the various limitations of valence bond theory.   **4**

4. Solve **any two** of the following : **10**

   1) Discuss the classification acids and bases on bases of Pearson's concept.

   2) Explain the formation of $[Fe(CN)_6]^{3-}$ on the basis of VBT.

   3) Discuss the magnetic property of 3d transition elements.

5. Attempt **any two** of the following : **10**

   1) Distinguish between metal chelate and metal complex.

   2) Give the atomic number, name and symbol of 4-d transition elements.

   3) Define geometrical isomerism. Show the geometrical isomerism in complex compound with CN = 4.

_____

SLR-W – 63

B.Sc. – II (Semester – III) Examination, 2016
PHYSICS (Paper – V) (Old)
General Physics, Heat and Sound

Day and Date : Monday, 11-4-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. :   i) **All** questions are **compulsory**.
       ii) Figures to the **right** indicate **full** marks.
       iii) Use of log table or scientific calculator is **allowed**.
       iv) **Neat** diagrams must be drawn **wherever** necessary.

1. Select correct alternative.   **10**

   i) By Lanchester's rule the relation between the precessional torque τ_1, gravitational torque τ_2 and centripetal torque τ_3 is _____

     a) $\tau_1 - \tau_2 = \tau_3$ b) $\tau_2 - \tau_3 = \tau_1$

     c) $\tau_1 + \tau_2 = \tau_3$ d) $\tau_2 + \tau_3 = \tau_1$

   ii) $\bar{a} \cdot (\bar{b} \times \bar{c}) = 0$, the vectors a, b and c are _____

     a) equal   b) not coplanar

     c) all zero   d) coplanar

   iii) The Curl of a vector field $\bar{V}$ is always _____

     a) Scalar   b) Zero

     c) Vector   d) None of these

   iv) In pure precessional motion nutation is _____

     a) Very small   b) Large

     c) Absent   d) None of these

   v) The rate of precession ϕ is _____

     a) $\dfrac{\tau_1}{I\omega}$ b) $\dfrac{I\omega}{\tau_1}$ c) $I\omega\,\tau_1$ d) $\dfrac{I\tau_1}{\omega}$

vi) If the lower end of loaded spring has extension x then the C.G. of the spring is lowered by _____

   a) x　　　　　　b) $\dfrac{x}{2}$　　　　c) 2x　　　　d) $\dfrac{x}{4}$

vii) The viscosities of two liquids may be compared with the help of _____
   a) Searle's viscometer
   b) Rotation viscometer
   c) Rankine's viscometer
   d) Ostwald viscometer

viii) Entropy is maximum in _____ state.
   a) gas　　　　　　　　　　b) solid
   c) liquid　　　　　　　　　d) semi-solid

ix) The frequency of ultrasonic is _____

   a) below 20 Hz

   b) 20 Hz to 20 kHz

   c) above 20 kHz

   d) 0 to ∞

x) $\nabla \times (\nabla\,\phi) = $_____

   a) $\nabla^2\phi$　　　　b) ϕ　　　　c) ∞　　　　d) 0

2. Answer **any five** of the following :　　　　　　　　　　　　　　**10**
   i) Define divergence of a vector field.
   ii) What do you mean by
       a) Precession
       b) Nutation.
   iii) What is entropy ? Give physical significance of entropy.
   iv) What are transducers ?
   v) Define coefficient of viscosity.
   vi) A metal wire with geometrical moment of inertia 2×10^{-6} cm^4 is bent to form a circle of 10 cm radius. What is bending moment ?
       (Y for metal wire $= 5 \times 10^{11}$ dyne/cm^2).

3. Answer **any two** of the following : **6**

   A) i) Compute $\bar{a} \cdot (\bar{b} \times \bar{c})$ where

   $\bar{a} = i + 2j - 3k \quad \bar{b} = 2i + 3j - k \quad \bar{c} = i - j + 2k$

   ii) Explain T-S diagram.

   iii) Write various applications of gyroscopic motion.

   B) Write a note on moving coil loudspeaker. **4**

4. Answer **any two** of the following : **10**

   i) Obtain an equation for period of gyroscope.

   ii) Describe Searle's method of determining the viscosity of highly viscous liquid.

   iii) If $\phi = 2y^2 - x^3z$ find $\nabla\phi$ at (1, −1, 2).

5. Answer **any one** of the following : **10**

   i) What is a flat spiral spring ? Deduce an expression for Young's modulus of the material of flat spiral spring.

   ii) What is reverberation time ? Derive Sabine's formula for reverberation time.

Seat No.

B.Sc. II (Semester – III) Examination, 2016
BIOCHEMISTRY (Paper – I) (Old)
Biomolecules

Day and Date : Monday, 11-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Figure to the **right** indicate **full** mark.
3) **Draw** structural formulae **wherever** necessary.

1. Write following sentences selecting most correct answer from given options :   **10**

   1) Fructose is a _____ monosaccharide.
      a) aldohexose   b) ketohexose   c) ketotetrose   d) aldotetrose

   2) _____ has $\alpha 1 \rightarrow 6$ bond linking two monosaccharides.
      a) Sucrose   b) Maltose   c) Isomaltose   d) Cellobiose

   3) _____ is an imino acid.
      a) Valine   b) Lysine   c) Glycine   d) Proline

   4) Glycoproteins contain _____ as prosthetic groups.
      a) carbohydrates b) lipids   c) nucleic acids   d) metal ions

   5) Thiamine deficiency causes
      a) pellagra   b) beriberi   c) burning feet   d) night blindness

   6) Dehydrogenases enzymes belong to _____ class of enzymes.
      a) hydrolases   b) transferases   c) lyases   d) oxidoreductases

   7) Terpenes are the lipids derived from
      a) triglycerides   b) waxes   c) isoprenes   d) sterols

   8) For enzyme catalysed reaction, its rate is maximum and constant at
      a) high pH   b) high temperature
      c) high substrate concentration   d) high enzyme concentration

9) Rhodopsin present in retina of eye contains vitamin _____ plus protein in its structure.

   a) retinal   b) riboflavin   c) pyridoxin   d) niacin

10) Carotenes belong to a class of

   a) waxes   b) triglycerides   c) terpenes   d) steroids

2. Answer **any five** from below :   **10**

  1) Differentiate between albumin and globulin.

  2) What is Zwitterion ?

  3) Explain peptones.

  4) What are isoenzymes ? Give one example.

  5) How are monosaccharides further classified ?

  6) Write down structural formula for NAD^+.

3. A) Attempt **any two** :   **6**

   1) Define Km. What is its significance ?

   2) What are deficiency disorders of thiamine ?

   3) Write one reaction catalysed by niacin coenzyme.

  B) Write a note on Waxes.   **4**

4. Solve **any two** from below :   **10**

  1) What is biochemical role of vitamin A ?

  2) Define and classify carbohydrate. Give detailed account of disaccharides.

  3) Classify enzymes with suitable examples.

5. Answer **any two** :   **10**

  1) Write a role of pyridoxal phosphate in amino acid metabolism.

  2) What is active site of enzyme ? Add a note on Induced fit hypothesis.

  3) Classify proteins. Give detailed account of conjugated proteins.

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Seat
No.

B.Sc. II (Semester – III) (Old) Examination, 2016
PHYSICS (Paper – VI)
Electronics

Day and Date : Tuesday, 12-4-2016   Total Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : i) **All** questions are **compulsory**.

ii) Figures to the **right** indicate full marks.

iii) **Use** of logtable or calculator is **allowed**.

iv) Neat diagrams must be drawn **whenever** necessary.

1. Select the correct alternative from the following.   **10**

   i) In Colpitt's oscillator _____ feed back is used.

   a) positive   b) negative   c) zero   d) one

   ii) Two stage amplifier contains _____ number of transistors.

   a) one   b) two   c) three   d) four

   iii) Intrinsic standoff ratio of an UJT is always

   a) equal to one   b) equal to zero

   c) greater than one   d) less than one

   iv) FET is _____ terminal semiconductor device.

   a) one   b) two   c) three   d) four

   v) The logic circuit used to perform addition of two binary bits is called as

   a) J-K flip-flop   b) R-S flip-flop

   c) Half adder   d) Full adder

vi) The Demorgan's first theorem is given by the relation $\overline{A+B}=$

    a) A.B   b) $\overline{A}.B$ c) $\overline{A} \cdot \overline{B}$ d) $\overline{A.B}$

vii) The time period of waveform measured on CRO is 10 ms the unknown frequency of wave is

    a) 50 Hz   b) 100 Hz   c) 150 Hz   d) 200 Hz

viii) Voltage regulator is used to provide a nearly _____ output.

    a) fluctuating   b) smooth   c) sinusoidal   d) constant

ix) IC 78 XX provides _____ fixed output voltage.

    a) positive   b) negative

    c) regulated positive   d) dual

x) A cathode ray oscilloscope is used to measure

    a) frequency   b) voltage   c) phase   d) all a, b and c

2. Answer **any five** of the following.   **10**

   i) What is feed back ? Give its type with definitions.

   ii) Give any two uses of CRO with details.

   iii) Define

      a) Transconductance and

      b) Amplification factor in FET.

   iv) Draw neat block diagram of CRO.

   v) Define non-sinusoidal waves with types.

   vi) What is flip-flop ? Give its types.

3. A) Answer **any two** of the following.   **6**

    i) Explain the working of full adder.

    ii) Discuss construction of UJT.

    iii) What is line and load regulation ? How it can be measured ?

B) A transistor phase shift oscillator uses three identical sections in the feed back network. The values of components are R = 320 KΩ and C = 400 pF. Calculate the frequency of oscillations. **4**

4. Answer **any two** of the following. **10**

   i) Write a short note on DMM.

   ii) State and prove Demorgan's second theorem.

   iii) Describe with neat circuit diagram the operation Colpitt's oscillator.

5. Answer **any one** of the following. **10**

   i) Describe regulated power supply with block diagram. Explain its need.

   ii) What is multistage transistor amplifier ? Explain two stage RC coupled transistor amplifier in detail.

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Seat No.

B.Sc. – II (Semester – III) Examination, 2016
BIOCHEMISTRY (Paper – II) (Old)
Biochemical Techniques

Day and Date : Tuesday, 12-4-2016　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　 2) Figures to the **right** indicate **full** marks.
　　　　　　　 3) Draw labelled diagrams **wherever** necessary.

1. Write following sentences selecting most correct answer from given options : **10**

　1) In spectrophotometer _____ is used to resolve a single beam of light into different rays of different wavelengths.
　　a) Refracting mirror　　　　　　b) Mercury lamp
　　c) Prism　　　　　　　　　　　d) Collimating mirror

　2) In calorimeter photocell is used to
　　a) Provide radiations
　　b) Split radiations
　　c) Reflect radiations
　　d) Convert light signal into electrical signal

　3) For electrophoresis of proteins _____ is used as a marker dye.
　　a) Oil red O　　　　　　　　　b) Amido black IOB
　　c) Bromophenol blue　　　　　d) Ethidium dibromide

　4) Viable cells are immobilised by _____ method.
　　a) Ionic binding　　　　　　　b) Physical adsorption
　　c) Covalent binding　　　　　　d) Entrapment in a gel

　5) The technique used for blot transfer of protein is called _____ blotting technique.
　　a) Western　　　　　　　　　　b) Southern
　　c) Northern　　　　　　　　　　d) Eastern

P.T.O.

6) _____ can be patented.

   a) Land

   b) Table

   c) Ornament

   d) Genetically modified microorganism

7) Large amount of same DNA can be produced using

   a) ELISA technique

   b) Polymerase chain reaction

   c) Hybridoma technology

   d) Western blotting technique

8) DNA polymerase chain reaction was invented by

   a) Karry Mullis

   b) G. Kohler and C. Milstein

   c) Southern

   d) Alwin, Kemp and Stark

9) For industrial manufacture of insulin, its A and B chains are prepared separately in

   a) E. Coli   b) S. Cerviceae

   c) Thermophilus furiosus   d) Thermophilus aquaticus

10) In gel permeation chromatography void volume means

   a) Volume of gel   b) Volume of water inside the gel

   c) Total volume of gel + water d) Volume of water outside the gel

2. Attempt **any five** from below :   **10**

   1) Define partition chromatography and distribution ratio.

   2) What are the precautions taken in selecting the primer for PCR technique ?

   3) What is the meaning of intellectual property ?

   4) What are disadvantages of CNBr activated enzyme immobilisation method ?

   5) What is difference between Souther blotting and Northern blotting techniques ?

   6) State and explain Beer's law.

3. A) Answer **any two** : **6**

   1) Explain about copyright.

   2) State and explain the principles of gel permeation chromatography.

   3) What is DNA finger printing ? What is its use ?

   B) Draw a labelled diagram of spectrophotometer. **4**

4. Answer **any two** from below : **10**

   1) Discuss industrial manufacture of insulin hormone.

   2) Explain immobilisation of enzyme by covalent binding methods.

   3) Write an account of DNA polymerase chain reaction.

5. Attempt **any two** : **10**

   1) Write an essay on patents.

   2) Discuss preparation of slab gel plate for SDS-PAGE.

   3) Write the mechanism of separation by gel permeation chromatography. What are its applications ?

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Seat
No.

B.Sc. – II (Semester – III) (Old) Examination, 2016
STATISTICS (Paper – V)
Continuous Probability Distributions – I

Day and Date : Wednesday, 13-04-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory** and carry **equal** marks.
                    2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative.   **10**

   1) If X is an exponential variate with mean 5 then second order raw moment is

      a) 5   b) 25   c) 50   d) 100

   2) E [X-E(X)]^2 is called

      a) Mean of X   b) Variance of X

      c) Covariance of X   d) None of these

   3) If X is a continuous r.v. then P[X > Q_2] =

      a) 0.5   b) 1   c) 0.75   d) 0.25

   4) Uniform distribution is

      a) +vely skewed   b) –vely skewed

      c) symmetric   d) none of these

   5) If X~exp (θ); then mean = variance only when

      a) $\theta = 1$ b) $\theta > 1$ c) $\theta < 1$ d) none of these

   6) If a r. v. X has exponential distribution with parameter $\theta = 0.5$, then P [X > 1] is

      a) e^{-2} b) $e^{-\frac{1}{2}}$ c) $\frac{1}{2}$ d) $\frac{1}{2e}$

P.T.O.

7) For exponential variate with parameter θ, the co-efficient of variation is

   a) 1　　　　　　　 b) 100　　　　　　 c) 0　　　　　　　 d) 10

8) For the joint p.d.f. f(x, y) the marginal p.d.f. of Y is given by

   a) $\sum_x f(x,y)$

   b) $\int_{-\infty}^{\infty} f(x,y)dx$

   c) $\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(x,y)dx$

   d) none of these

9) With usual notations E [(X–E(X)) (Y–E(Y))] is called

   a) Variance of X

   b) COV (X,Y)

   c) Variance of Y

   d) None of these

10) If X is continuous r.v. with c.d.f. F(x) then Y = F (x) is

   a) U (–1, 1)

   b) U (0, 2)

   c) U (0, 1)

   d) U (1, 2)

2. Attempt **any five** of the following :　　　　　　　　　　　　　　　　　　**10**

   a) Define m.g.f. of a r.v. X. Hence obtain m.g.f. of AX + B. Where A and B are constants.

   b) Let (X, Y) be a bivariate continuous r.v. then define expectation of a function g (X, Y).

   c) Obtain M.G.F. of exponential distribution with parameter θ.

   d) Let (X, Y) be a bivariate continuous r.v. then define conditional variance of X given Y = y.

   e) Let (X, Y) be a bivariate continuous r.v. then define Independence of X and Y.

   f) If X~exp (θ) find the c.d.f. of X.

3. A) Attempt **any two** of the following :　　　　　　　　　　　　　　　　　　**6**

   a) The p.d.f. of a continuous r.v. is

   f(x)　= 2x ; 0 < x < 1

   　　　= 0 ; otherwise

   Find mean and variance of X.

   b) Define marginal distributions of X and Y.

   c) Define exponential distribution with parameter θ. Obtain its median.

   B) If X~U (a, b), find its c.d.f. and hence find median.　　　　　　　　　　　**4**

4. Attempt **any two** of the following : **10**

   a) Define uniform distribution over (a, b). Find mean and variance of the distribution.

   b) Let X and Y are two independent continuous random variables, then show that $E(XY) = E(X). E(Y)$

   c) Define c.d.f. of a continuous r.v. State its properties.

5. Attempt **any one** of the following : **10**

   a) Let X and Y be two independent r.v.s. having pdf's as

   $f(x) = e^{-x}$; x > 0 and $f(y) = e^{-y}$; y > 0 find the distribution of X + Y.

   b) If X is a r.v. with p.d.f.

   $f(x) = 2e^{-2x}$; x > 0

       = 0 ; otherwise

   Find m.g.f. of X and hence find mean and variance.

   _____

Seat
No.

B.Sc. – II (Semester – III) (Old) Examination, 2016
GEOCHEMISTRY
Introduction to Geochemistry (Paper – I)

Day and Date : Wednesday, 13-4-2016　　　　　　　　　Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

Instructions : i) **All** questions carry **equal** marks.
　　　　　　　ii) Figures to the **right** indicate **full** marks.
　　　　　　　iii) Draw **neat** diagrams **wherever** necessary.

1. Choose the correct alternative each of the following.　　　　　　**10**

　　1) Water system is _____ component system.

　　　　a) One　　　　　b) Two　　　　　c) Three　　　　d) Four

　　2) The radius ratio of CsCl is

　　　　a) 0.8　　　　　b) 0.93　　　　　c) 0.5　　　　　d) 0.1

　　3) The number of atoms per unit cell in F.C.C. crystal is

　　　　a) 1　　　　　　b) 2　　　　　　c) 3　　　　　d) 4

　　4) In covalent bonding, these is _____ of electrons.

　　　　a) Sharing　　　　　　　　b) Transfer

　　　　c) Acceptance　　　　　　d) None of these

　　5) The ratio of Si : O in a single chain silicate structure is

　　　　a) 1 : 2　　　　　b) 1 : 3　　　　　c) 1 : 4　　　　d) 2 : 3

　　6) P = C is _____ phase rule.

　　　　a) Gibb's　　　　　　　　b) Avogadro's

　　　　c) Goldschmidt's　　　　d) None of these

　　7) If the co-ordination number of molecule is three, its geometry is

　　　　a) Linear　　　　　　　　b) Tetrahedral

　　　　c) Pyramidal　　　　　　d) Octahedral

8) In NaCl, each sodium ion is surrounded by _____ chloride ions.

    a) 4   b) 6   c) 8   d) 10

9) The atomic substitution _____ at higher temperature.

    a) Increase   b) Decreases

    c) Remains constant   d) None of these

10) The temperature at which rhombic sulphur converts into monoclinic sulphur is called as

    a) Melting point   b) Transition temperature

    c) Boiling point   d) None of these

2. Answer **any five** of the following :   **10**

    1) Define (a) phase (b) component of a system.

    2) Explain ionic radii of common ion in rock forming minerals.

    3) Define lattice energy.

    4) Explain frame structure of silicate.

    5) Define covalent bond.

    6) State Gibb's phase rule.

3. A) Attempt **any two** of the following :   **6**

    i) State and explain electronegativity.

    ii) Explain states of matter.

    iii) Discuss the structure of NaCl.

   B) Show that $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$ is two component system.   **4**

4. Attempt **any two** of the following :   **10**

   i) Discuss sulphur system.

   ii) Give the general rules of bond type.

   iii) Explain Polymorphism.

5. Attempt **any two** of the following :   **10**

   i) Discuss water system.

   ii) Discuss the sheet structure of silicate.

   iii) Discuss NaCl structure with respect to lattice energy, radius ratio.

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Seat No.

B.Sc. – II (Semester – III) (Old) Examination, 2016
ZOOLOGY (Paper – V)
Animal Diversity – III

Day and Date : Wednesday, 13-4-2016   Total Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
      2) Draw **neat** labelled diagrams **wherever** necessary.
      3) **All** questions carry **equal** marks.

1. Select the appropriate answer from those given below **each** question and rewrite the sentence.   **10**

   1) Anal styles are found
      a) Female cockroach   b) Male cockroach
      c) Butterfly   d) Both a and b

   2) Numbers of teeth present in gizzard of cockroach are
      a) 7   b) 5   c) 6   d) 8

   3) Glosa and paraglosa are the parts of
      a) Mandible   b) Hypopharynx   c) 1st maxilla   d) 2nd maxilla

   4) Swimming types of foots are present in
      a) Aplysia   b) Pila   c) Sepia   d) Mytilus

   5) Bipinnaria is the larval stage of
      a) Annelida   b) Echinodermata
      c) Mollusca   d) Hemichordata

   6) In Pila, statosyst is organ for
      a) Hearing   b) Vision   c) Olfactory   d) Equilibrium

   7) For control of mosquito population _____ fish is used as biological agent.
      a) Mrigal   b) Labeo   c) Gambusia   d) Catla

   8) Malpighian tubules in cockroach are used for
      a) Excretory   b) Reproductive   c) Digestion   d) Nervous

    9) Malaria is caused by

       a) Aedes aegypti   b) P. vivax   c) P. ovalis   d) Ascaris

   10) In radula of pila _____ Teeth are present in single row ?

       a) 7   b) 6   c) 5   d) 9

2. Answer **any five** of the following :   **10**

   1) Mushroom gland in cockroach.

   2) Functions of foot in mytilus.

   3) Salient features of phylum Mollusca.

   4) Symptoms of malaria disease.

   5) Statocyst of pila.

   6) Gizzard of cockroach.

   7) Leg of cockroach.

3. A) Answer **any two** of the following :   **6**

    1) Salivary gland of cockroach.

    2) Osphradium of pila.

    3) Symptoms and control measures of filarial disease.

  B) Radula of Pila.   **4**

4. Write answer **any two** of the following :   **10**

   1) Explain nervous system of cockroach.

   2) Female reproductive system of Pila.

   3) Describe the mouth parts of housefly.

5. Write answer to **one** of the following :   **10**

   1) Digestive system of cockroach.

   2) Describe nervous system of Pila.

_____

Seat No.

B.Sc. – II (Semester – III) Examination, 2016
STATISTICS (Paper – VI) (Old)
Discrete Probability Distributions and Statistical Methods

Day and Date : Saturday, 16-4-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions :   i) **All** questions are **compulsory** and carry **equal** marks.
                          ii) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative :   **10**

   i) If X is a Poisson variate with $P[X = 3] = P[X = 4]$, then the variance of a Poisson variate is

   a) 4   b) 2   c) 3   d) 5

   ii) If X and Y are two independent Poisson variates such that $X \sim P(1)$ and $Y \sim P(2)$ then $P[X + Y < 3]$ is

   a) e^{-3} b) $3e^{-3}$ c) $4e^{-3}$ d) $8.5e^{-3}$

   iii) If $X \sim Geo(0.6)$, then the variance of waiting time distribution is

   a) $\dfrac{10}{6}$ b) $\dfrac{10}{4}$ c) $\dfrac{10}{9}$ d) $\dfrac{3}{2}$

   iv) If $X \sim Geo(0.9)$, then the distribution of X+1 is _____ distribution.

   a) Poisson   b) Geometric   c) Waiting time   d) None of these

   v) Negative binomial distribution NB(r, p) reduces to geometric distribution when r equal to

   a) 0   b) 1   c) ∞ d) None of these

   vi) Let (X_1, X_2, X_3, X_4) be a random vector follows multinomial distribution with usual notations, then $E(X_3)$ is

   a) $4P_3$ b) $4P_3(1 - P_3)$ c) $P_1 P_3$ d) nP_3

   vii) A measure a linear association of a variable say X_1 with number of other variables $X_2, X_3,...X_k$ is

   a) Partial correlation   b) Simple correlation

   c) Multiple correlation   d) Auto correlation

viii) If $R_{1.23} = 1$, then $R_{2.13}$ is equal to

    a) 0   b) 0 to 1   c) 1   d) None of these

  ix) The partial correlation coefficient $r_{13.2}$ is called

    a) First order partial correlation

    b) Zero order partial correlation

    c) Second order partial correlation

    d) None of these

  x) In the usual notations, $r_{21.3}$ is equal to

    a) $\dfrac{r_{12}^2 - r_{13}r_{23}}{\sqrt{\left(1 - r_{13}^2\right)\left(1 - r_{23}^2\right)}}$
               b) $\dfrac{r_{13}r_{23} - r_{12}^2}{\sqrt{\left(1 - r_{13}^2\right)\left(1 - r_{23}^2\right)}}$

    c) $\dfrac{r_{12} - r_{13}r_{23}}{\sqrt{\left(1 - r_{13}^2\right)\left(1 - r_{23}^2\right)}}$
               d) $\dfrac{r_{13} - r_{12}}{\sqrt{\left(1 - r_{13}^2\right)\left(1 - r_{12}^2\right)}}$

2. Attempt **any five** of the following :   **10**

  i) Define Poisson distribution, state its mean and variance.

  ii) Let X be geometric variate with parameter p, then show that $P[X \geq x] = (1 - p)^x$.

  iii) Define multinational distribution.

  iv) Obtain the probability generating function of waiting time distribution.

  v) State the two properties of residual.

  vi) If $r_{12} = r_{13} = r_{23} = r \neq 1$, then show that $R_{1.23}^2 = \dfrac{2r^2}{(1 + r)}$.

3. A) Attempt **any two** of the following :   **6**

    i) Define negative binomial distribution with parameters r and p. Find its mean.

    ii) If X and Y are independent Poisson variates with means 2 and 4 respectively, then find $P\left(\dfrac{X + Y}{2} < 1\right)$.

    iii) Find mean and variance of waiting time distribution.

  B) Define the partial regression coefficients $b_{12.3}$ and give its interpretation.   **4**

4. Attempt **any two** of the following : **10**

   i) Derive Poisson distribution as a limiting case of a binomial distribution.

   ii) Define Geometric distribution with parameter p and obtain its mean and variance.

   iii) State and prove the recurrence relation for probability of negative binomial distribution.

5. Attempt **any one** of the following : **10**

   i) Define the residual of variable X_1 with respect X_2 and X_3 and obtain its variance in terms of simple correlation co-efficient.

   ii) Define multiple correlation coefficient $R_{1.23}$ and obtain an expression for $R_{1.23}$ in terms of simple correlation co-efficients.

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Seat
No.

B.Sc. II (Semester – III) Examination, 2016
ZOOLOGY (Old) Paper – VI
Cell Science, Genetics, Biological Chemistry and Economic Zoology

Day and Date : Saturday, 16-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

*N.B. : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Draw **neat** labelled diagrams **wherever** necessary.*

1. Complete the sentence selecting appropriate answer.   **10**

   1) _____ is the ratio of the suplementary factor.

      a) 9 : 3 : 4   b) 9 : 7   c) 13 : 3   d) 9 : 3 : 3 : 1

   2) _____ is process of division of the cytoplasm.

      a) Protein synthesis   b) Cytosynthesis

      c) Cytokinesis   d) Glycolysis

   3) Incomplete linkage is found in _____

      a) Male Drosophila   b) Female Drosophila

      c) Both a and b   d) None of the above

   4) Worker bee is _____

      a) Sterile male   b) Fertile male   c) Sterile female   d) Fertile female

   5) Jaffarabadi is breed of _____

      a) Cow   b) Buffalo   c) Goat   d) Poultry

   6) Rearing of birds for production of egg and meat is called _____

      a) Dairy science   b) Poultry science

      c) Pearl science   d) Fishery science

   7) Which of the following is ornamental fish _____

      a) Gold fish   b) Scoliodon   c) Cat fish   d) Dog fish

8) DNA contains _____ sugars.

   a) Starch   b) Glucose   c) Deoxyribose   d) Ribose

9) Milk is secretion of _____

   a) Salivary gland   b) Mammary gland

   c) Gastric gland   d) Thyroid gland

10) Silkmoth belongs to phylum _____

   a) Arthropoda   b) Annilida

   c) Echinodermata   d) Mollusca.

2. Answer **any five** of the following :   **10**

  i) Honey

  ii) Food value of fish

  iii) Cow breeds

  iv) Egg

  v) Coupling phase

  vi) Metaphase

  vii) Significance of crossing over.

3. A) Answer **any two** of the following :   **6**

   i) Complementary interaction.

   ii) Economic importance of Goat farming.

   iii) Importance of Linkage.

  B) Castes of Honey bee.   **4**

4. Answer **any two** of the following :   **10**

  i) Describe housing of poultry.

  ii) Life cycle of silkmoth.

  iii) Types of RNA.

5. Answer **any one** of the following :   **10**

  i) Explain various milk products.

  ii) Explain glass Aquarium and ornamental fishes.

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SLR-W – 77

Seat No.	

B.Sc. II (Semester – III) (Old) Examination, 2016
MATHEMATICS (Paper – V)
Differential Calculus

Day and Date : Monday, 18-4-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : i) **All** questions are **compulsory**.
ii) Figures to the **right** indicate **full** marks.

1. Select the correct alternative for **each** of the following :   **10**

   1) The angle of intersection of two curves is defined as the angle between their
      a) normals   b) radius vectors
      c) tangents   d) none of these

   2) Polar subtangent for curve $r = a\theta$ is

      a) $\dfrac{r^2}{a}$ b) a   c) $\dfrac{a}{r^2}$ d) $\dfrac{1}{a}$

   3) The radius of curvature at the point (s, ψ) on the curve $s = c.\log\sec\psi$ is
      a) $C\sin\psi$ b) $C\cos\psi$
      c) $C\tan\psi$ d) $C\cot\psi$

   4) The radius of curvature of $y = 4\sin x - \sin 2x$ at $x = \dfrac{\pi}{2}$ is

      a) $5\sqrt{5}$ b) $\dfrac{5\sqrt{5}}{4}$ c) $\dfrac{\sqrt{5}}{4}$ d) $\dfrac{5}{4}$

   5) The radius of curvature for $r^3 = a^2 p$ is

      a) $\dfrac{a^2}{3r}$ b) $\dfrac{3r}{a^2}$ c) $\dfrac{r^3}{a^2}$ d) a

P.T.O.

6) If $u = x^2 - y^2$, $v = xy$ then $\dfrac{\partial(u, v)}{\partial(x, y)} =$

  a) $x^2 + y^2$ b) $2(x^2 + y^2)$

  c) $x^2 - y^2$ d) $2(x^2 - y^2)$

7) If $x = r\cos\theta$, $y = r\sin\theta$ then $\dfrac{\partial(r, \theta)}{\partial(x, y)} \times \dfrac{\partial(x, y)}{\partial(r, \theta)}$ is equal to

  a) 0   b) 1   c) 2   d) ∞

8) The necessary condition for a function to have an extreme value at $x = c$ is that

  a) $f'(c) < 0$ b) $f'(c) > 0$

  c) $f'(c) = 0$ d) none of these

9) A function $f(x, y)$ has minimum value at (a, b) if

  a) $AC - B^2 > 0$ and $A > 0$ b) $AC - B^2 > 0$ and $A < 0$

  c) $AC - B^2 < 0$ and $A > 0$ d) $AC - B^2 < 0$ and $A < 0$

10) For the curve $r = a(1 + \cos\theta)$ the value of $\dfrac{ds}{d\theta} =$

  a) $2a\cos\theta$ b) $2a\sin\theta$

  c) $2a\cos\left(\theta/2\right)$ d) $2a\sin\left(\theta/2\right)$

2. Answer **any five** of the following :   **10**

  i) Find the tangents and normals to the curve $y^2 = 4ax$ at $(a, -2a)$.

  ii) Find the angle between the pairs of curves $y = \sin x$, $y = \cos x$ at their point of intersection.

  iii) For the cycloid $x = a(t + \sin t)$, $y = a(1 - \cos t)$, prove that $\rho = 4a\cos\left(t/2\right)$.

  iv) If $u = 3x + 2y - z$, $v = x - 2y + z$, $w = x(x + 2y - z)$, find $\dfrac{\partial(u, v, w)}{\partial(x, y, z)}$.

  v) Investigate maximum and minimum values of the function given by $u = 2x^3 - 15x^2 + 36x + 10$.

  vi) Examine for maximum and minimum values of the function $z = x^2 - 3xy + y^2 + 2x$.

3. A) Answer **any two** of the following : **6**

    i) If x + y + z = u, y + z = uv, z = uvw, find $\dfrac{\partial(x, y, z)}{\partial(u, v, w)}$.

    ii) Prove that the radius of curvature at the point $\left(\dfrac{3a}{2}, \dfrac{3a}{2}\right)$ on the folium

        $x^3 + y^3 = 3$ axy is $\dfrac{3\sqrt{2}.a}{16}$.

    iii) Find the minimum value of $x^2 + y^2 + z^2$ when x + y + z = 3a.

  B) If x = a (u + v), y = b (u − v) and $u = r^2 \cos 2\theta$, $v = r^2 \sin 2\theta$ find $\dfrac{\partial(x, y)}{\partial(r, \theta)}$. **4**

4. Answer **any two** of the following : **10**

    i) Find the radius of curvature at any point (r, θ) on the cardioid $r = a(1 + \cos \theta)$

       and show that $\dfrac{\rho^2}{r} = $ constant.

    ii) Show that the functions u = x + y − z, v = x − y + z, $w = x^2 + y^2 + z^2 - 2yz$ are dependent to each other and find the relation between them.

    iii) A rectangular box open at the top, have volume of 32 cubic feet, what must be the dimensions so that total surface is minimum.

5. Answer **any one** of the following : **10**

    i) If u, v, w are functions of x, y, z having first order partial derivatives and x, y, z are themselves functions of p, q, r whose first order partial derivatives exists

       then prove that $\dfrac{\partial(u, v, w)}{\partial(x, y, z)} \times \dfrac{\partial(x, y, z)}{\partial(p, q, r)} = \dfrac{\partial(u, v, w)}{\partial(p, q, r)}$. Also if x, y are roots of a

       quadratic equation in p given by $(p - u)^2 + (p - v)^2 = 0$, then prove that

       $\dfrac{\partial(x, y)}{\partial(u, v)} = \dfrac{-(u - v)}{x - y}$.

    ii) Explain Lagrange's method of un determined multipliers to find extreme values of u = f (x, y, z) when ϕ (x, y, z) = 0. Hence find the minimum value of $x^2 + y^2 + z^2$ subject to condition x + 2y − 4z = 5.

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Seat No.

B.Sc. – II (Semester – III) Examination, 2016
BOTANY (Old)
Structural Botany and Taxonomy of Angiosperms (Paper – V)

Day and Date : Monday, 18-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions :   1) **All** questions are **compulsory**.
       2) Draw **neat** labelled diagrams **wherever** necessary.
       3) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences, choosing the correct alternative :   **10**

     1) Multiple epidermis is found in _____ plants.

       a) hydrophytic   b) mesophytic   c) xerophytic   d) epiphytic

     2) Motor cells are found in the epidermis of _____ plants.

       a) gymnosperm   b) monocot   c) dicot   d) none of these

     3) The parenchyma which contains air cavities are called as

       a) aerenchyma   b) sclerenchyma

       c) collenchyma   d) fibres

     4) Digestive glands are present in _____ plant.

       a) *Euphorbia*   b) *Ocimum*   c) *Drosera*   d) All

     5) _____ is living mechanical tissue.

       a) Vesseles   b) Tracheids   c) Collenchyma   d) Sclerenchyma

     6) The intercalary meristem is responsible for increase in

       a) height of internode   b) width of internode

       c) both   d) none of these

     7) On the basis of position the meristems are classified into _____ groups.

       a) one   b) two   c) three   d) four

8) The scattered vascular bundles are found in the stem of

a) *nerium*　　　b) sunflower　c) maize　　　d) *hibiscus*

9) Companion cells are found in

a) meristem　　　b) phloem　　c) xylem　　　d) parenchyma

10) *Calotropis procera* belongs to family

a) Combretaceae　　b) Asclepidacee c) Amranthaceae d) Liliaceae

2. Answer **any five** of the following : 　　　　　　　　　　**10**

i) Define the anomalous growth.

ii) Give the functions of aerenchyma.

iii) Describe the heart wood.

iv) Mention the functions of collenchyma.

v) Sketch and describe the monocotyledonous stomata.

vi) Give the economic importance of family asclepiadaceae.

3. A) Answer **any two** of the following : 　　　　　　　　　**6**

i) Describe the different types of parenchyma.

ii) Describe the mechanical tissues in leaves.

iii) Classification of meristem based on origin.

B) Describe the Histogen theory. 　　　　　　　　　　　　**4**

4. Answer **any two** of the following : 　　　　　　　　　　**10**

i) Anomalous secondary growth in *Dracaena* stem.

ii) Describe the different types of dicotyledonous stomata.

iii) Describe the internal primary structure with reference to tissues and functions in dicotyledonous root.

5. Answer **any two** of the following : 　　　　　　　　　　**10**

i) Describe types of vascular bundles studied by you.

ii) Describe the different elements of Phloem.

iii) Give the distinguishing characters of any one of following family and mention plant of economic importance from family with their uses.

a) Combretaceae.

b) Fabaceae.

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Seat No.

B.Sc. – II (Semester – III) (Old) Examination, 2016
MATHEMATICS (Paper – VI)
Real Analysis

Day and Date : Wednesday, 20-4-2016 Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative for **each** of the following : **10**

   1) Which is not an open set for open sets I_k

   a) $\bigcap\limits_{k=1}^{n} I_k$
   b) $\bigcup\limits_{k=1}^{n} I_k$
   c) $\bigcap\limits_{k=1}^{\infty} I_k$
   d) $\bigcup\limits_{k=1}^{\infty} I_k$

   2) For any real numbers x, a and $\varepsilon > 0$, if $|x - a| < \varepsilon$ iff _____

   a) $-\varepsilon < x < \varepsilon$
   b) $\varepsilon < x < -\varepsilon$

   c) $a - \varepsilon < x < a + \varepsilon$
   d) $a + \varepsilon < x < a - \varepsilon$

   3) Which set is uncountable ?
   a) {2, 4, 9, ...}
   b) set of rationals
   c) (a, b)
   d) set of primes

   4) The set of limit points of {1, 3, 7, 11} is _____
   a) {1}
   b) {11}
   c) {1, 3, 7, 11}
   d) None of these

   5) If $\sum a_n$ are positive term series such that $\lim\limits_{n \to \infty} \left(n \log \dfrac{a_n}{a_{n+1}} \right) = l$ then the

   series converges if _____
   a) $l > 1$
   b) $l < 1$
   c) $l = 1$
   d) None of these

   6) The decreasing sequence is _____

   a) $\left\{ 2 + \dfrac{1}{n} \right\}$
   b) $\left\{ 2 - \dfrac{1}{n} \right\}$
   c) $\left\{ 1 - \dfrac{1}{n} \right\}$
   d) $\left\{ -\dfrac{1}{n} \right\}$

7) The least upper bound of the sequence $\left\{1 - \dfrac{1}{n}\right\}$ is _____

     a) 0   b) –1   c) 1   d) None of these

8) The series $\sum \dfrac{1}{n^{3/4}}$ is _____

     a) convergent   b) divergent

     c) oscillatory   d) none of these

9) The sequence $\left\{(-1)^n n\right\}$ is _____

     a) bounded below

     b) bounded above

     c) bounded below as well as bounded above

     d) neither bounded below nor bounded above

10) The series $\sum\limits_{n=2}^{\infty} \dfrac{1}{n\,(\log n)^p}$ is convergent if _____

     a) $p = 1$ b) $p < 1$ c) $p \leq 1$ d) $p > 1$

2. Attempt **any five** of the following :   **10**

1) Show that $\lim\limits_{n \to \infty} \dfrac{1}{n}\left[1 + 2^{1/2} + 3^{1/3} + \ldots + n^{1/n}\right] = 1$.

2) For all real number x, y then prove that $\left| x - y \right| \geq \left| \left| x \right| - \left| y \right| \right|$.

3) Show that the series $\{S_n\}$ where

$$S_n = \frac{1}{n+1} + \frac{1}{n+2} + \ldots + \frac{1}{n+n} \ \forall\, n \in N \text{ is convergent.}$$

4) Show that the series $\dfrac{1}{2} + \dfrac{2}{3} + \dfrac{3}{4} + \ldots$ is not convergent.

5) If for any $\varepsilon > 0, \left| b - a \right| < \varepsilon$ then prove that $b = a$.

6) Test for convergence the series whose n^{th} term is $\left\{(n^3 + 1)^{1/3} - n\right\}$.

3. A) Attempt **any two** of the following : **6**

    1) If $\{a_n\}$, $\{b_n\}$ and $\{c_n\}$ are three sequences such that

       i) $a_n \leq b_n \leq c_n \ \forall n$ and

       ii) $\lim\limits_{n \to \infty} a_n = l = \lim\limits_{n \to \infty} c_n$ then $\lim\limits_{n \to \infty} b_n = l$.

    2) Show that a set S of real number is bounded if there exist a real number $G > 0$ such that $\left| x \right| < G \ \forall \ x \in S$.

    3) Prove that $\sum \dfrac{1}{n^2}$ is convergent.

  B) If A and B are countable set. Prove that $A \times B$ is countable. **4**

4. Attempt **any two** of the following : **10**

    1) If S and T are subset of real number then show that $(S \cup T)' = S' \cup T'$.

    2) Prove that every bounded sequence has limit point.

    3) A series $\sum u_n$ converges if and only if for each $\varepsilon > o \ \exists$ a positive integer m such that.

$$\left| u_{n+1} + u_{n+2} + \ldots + u_{n+p} \right| < \varepsilon \ \forall \ n \geq m \wedge P \geq 1$$

5. Attempt **any one** of the following : **10**

    1) If $\sum u_n$ is positive term series such that $\lim\limits_{n \to \infty} \dfrac{u_{n+1}}{u_n} = l$ then the series :

      i) converges if $l < 1$

      ii) diverges if $l > 1$ and

      iii) the test fail if $l = 1$.

    2) Let a sequence of closed interval $[a_n, b_n]$ is such that $[a_{n+1}, b_{n+1}] \subseteq [a_n, b_n]$ and $\lim\limits_{n \to \infty} (b_n - a_n) = 0$, then there is one and only one point common to all the interval of the sequence.

Seat
No.

B.Sc. II (Semester – III) (Old) Examination, 2016
BOTANY (Paper – VI)
Plant Ecology

Day and Date : Wednesday, 20-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. : i) **All** questions are **compulsory**.
ii) Figures to the **right** indicate **full** marks.
iii) Draw neat labelled diagrams **wherever** necessary.

1. Rewrite sentence by choosing correct alternative.   **10**

   1) Production of new individual by birth, germination, Fusion is termed as _____

      a) Mortality   b) Natality   c) Density   d) Fertility

   2) Green plants are _____

      a) Secondary consumer   b) Primary consumer

      c) Tertiary consumer   d) Producer

   3) _____ shows poorly developed root system.

      a) Mesophyte   b) Hydrophy   c) Xerophyte   d) Epiphyte

   4) _____ stomata is character of Xerophyte.

      a) Sunken   b) Superficial   c) Water   d) External

   5) Aggregation of different types of plant population at a habitat is called _____

      a) Plant community   b) Animal community

      c) Biotic community   d) All of these

   6) The pioneer stage of hydrosere is represented by _____

      a) Phytoplankton   b) Hydrilla   c) Chara   d) Typha

   7) The disease Jaundic is caused by _____ pollution.

      a) Air   b) Water   c) Soil   d) Land

P.T.O.

8) The plant growing in extremely dry habit are known as _____

    a) Hydrophyte   b) Mesophyte   c) Xerophy   d) Oxalophyte

9) _____ is a biotic component of ecosystem.

    a) Light   b) Soil   c) Temperature   d) Plant

10) Increasing concentration of _____ in air causes green house effect.

    a) SO_2 b) NO_2 c) CO_2 d) O_2

2. Answer **any five** of the following.   **10**

   i) Define hydrophyte.

   ii) What is meant by primary succession ?

   iii) State any two morphological adaptation of Xerophyte.

   iv) Pollutants of air pollution.

   v) Define natality.

   vi) Enlist non-living components of ecosystem.

3. A) Answer **any two** of the following.   **6**

    i) Write morphological adaptation of hydrophyte.

    ii) Effect of water pollution.

    iii) Kinds of succession.

  B) Describe the pyramids of biomass.   **4**

4. Answer **any two** of the following.   **10**

   i) What is ecosystem ? Write energy flow in ecosystem.

   ii) Describe the quantitative characters of plant community.

   iii) What is pollution ? Write causes of air pollution.

5. Write **any one** of the following.   **10**

   i) What is succession ? Add a note on stages hydrosere.

   ii) Define population ecology ? Write natality and mortality.

_____

Seat
No.

B.Sc. – II (Semester – III) (Old) Examination, 2016
ELECTRONICS
Electronics Circuits (Paper – V)

Day and Date : Thursday, 21-4-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

N.B : 1) *All* questions are **compulsory**.

     2) Draw **neat** diagrams **wherever** necessary.

     3) Figures to the **right** indicate **full** marks.

     4) **Use** of calculator is **allowed**.

1. Select the correct alternative.   **10**

   i) The efficiency of half wave rectifier is _____ %.

     a) 40.6   b) 81.2   c) 48.6   d) 100

   ii) The PIV of diode in fullwave rectifier is _____

     a) V_m b) $2\,V_m$ c) $\dfrac{V_m}{2}$ d) $\dfrac{V_m}{\sqrt{2}}$

   iii) In transistor amplifier _____ junction is reverse biased.

     a) Collector   b) Emitter   c) Both   d) None

   iv) The stability factor of CE amplifier with fixed bias is

     a) 1   b) β c) $1+\beta$ d) $1-\beta$

   v) In a multistage amplifier $A_1 = 10$ dB and $A_2 = 5$dB. Then overall gain is _____ dB.

     a) 15   b) 50   c) 5   d) 2

P.T.O.

vi) In class B power amplifier transistor conducts for

    a) 0°   b) 90°   c) 180°   d) 360°

vii) With negative feedback gain of the amplifier

    a) Increases   b) Decreases

    c) Remains same   d) None of these

viii) CC amplifier is an example of _____ feedback.

    a) Voltage series   b) Current series

    c) Voltage shunt   d) Current shunt

ix) In Hartley oscillator _____ is tapped.

    a) Resistor   b) Capacitor

    c) Inductor   d) All

x) RC oscillators are suitable for _____ frequency.

    a) Low   b) High

    c) Very high   d) None

2. Answer **any five** of the following :   **10**

  i) What is multistage amplifier ? Why it is required ?

  ii) Draw the circuit diagram for Class B push-pull amplifier.

  iii) What are different types of negative feedback ?

  iv) Define the terms :

    a) PIV

    b) Ripple factor.

  v) Draw the circuit diagram of emitter biasing method.

  vi) What are the conditions for sustained oscillations ?

3. A) Answer **any two** of the following : **6**

    i) Explain bridge rectifier.

    ii) Explain distortion in power amplifier.

    iii) What is the effect of negative feedback on gain, bandwidth and distortion ?

   B) Write a note on direct coupled amplifier. **4**

4. Answer **any two** of the following : **10**

    i) Explain capacitor filter.

    ii) Draw equivalent circuit of FET CS amplifier and derive expression for voltage gain.

    iii) Explain crystal oscillator.

5. Answer **any one** of the following : **10**

    i) Explain voltage divider bias and derive expression for the stability factor.

    ii) Write notes on :

      a) Zener regulator.

      b) Phase shift oscillator.

_____

Seat No.

B.Sc. II (Semester – III) (Old) Examination, 2016
GEOLOGY
Optics and Mineralogy (Paper – V)

Day and Date : Thursday, 21-4-2016　　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions :　1) **All** questions are **compulsory**.
　　　　　　　　2) Figures to the **right** indicate **full** marks.
　　　　　　　　3) Draw neat labelled diagrams **wherever** necessary.

1. Fill in the blanks with correct answer from given options :　　　　**10**

　1) When Refractive index of minerals is near to refractive index of Canada balsam, then the mineral has _____ relief ?

　　a) low　　　　　　　　　　　　b) medium

　　c) high　　　　　　　　　　　　d) very high

　2) What is refractive index of Canada balsam ?

　　a) 1.537　　　b) 1.516　　　c) 1..658　　　d) 1.536

　3) Muscovite mineral shows _____ structure.

　　a) nesosilicate　　　　　　　　b) sorosilicate

　　c) inosilicate　　　　　　　　　d) phylosilicate

　4) Orthoclase and microcline are _____ of $KAlSi_3O_8$.

　　a) pseudomorphs　　　　　　　b) isomorphs

　　c) polymorphs　　　　　　　　d) none of these

　5) The charge on SiO_4 tetrahedron is _____

　　a) – 6　　　　b) – 5　　　　c) – 4　　　　d) – 3

　6) Biotite mica is dark in colour because of its _____ content.

　　a) Mg and Ca　　b) Ca and Mn　　c) K and Al　　d) Mg and Fe

P.T.O.

7) Red coloured cryptocrystalline variety of silica is _____

   a) chalcedony   b) jasper   c) agate   d) opal

8) Cleavage angle in the pyroxenes is about _____ degrees.

   a) 45   b) 60   c) 90   d) 180

9) Which one of the following is NOT a member of carbonates ?

   a) calcite   b) magnesite

   c) magnetite   d) aragonite

10) Garnets occurs only in _____ type of rocks.

    a) igneous   b) sedimentary

    c) metamorphic   d) none of these

2. Answer **any five** of the following :   **10**

   i) What is upper polariser called as ?

   ii) How to distinguish between isotropic and anisotropic minerals using a petrographic microscope ?

   iii) What is plane polarized light ?

   iv) Name any four plagioclases.

   v) Name the crystalline silica minerals.

   vi) Describe encrustation.

3. A) Answer **any two** of the following :   **6**

   i) Describe in brief pleochroism.

   ii) Explain different types of twinnings.

   iii) What is extinction ? How extinction angle is measured ?

   B) Write answer of **any one** :   **4**

   i) Describe any four types of pseudomorphism.

   ii) What is isomorphism ? Describe with examples.

4. Answer **any two** of the following : **10**

   i) Describe upper assembly of petrological microscope.

   ii) Describe phylo and tecto silicates.

   iii) What are alumino-silicates ? Describe their physical, chemical and optical properties and occurrences.

5. Answer **any two** of the following : **10**

   i) What are carbonates ? Describe their physical, chemical and optical properties and occurrences.

   ii) What are minerals of silicate group ? Add a note on physical, chemical and optical properties of any five minerals.

   iii) Describe chlorite group of minerals.

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Seat No.

B.Sc. – II (Semester – III) (Old) Examination, 2016
MICROBIOLOGY (Paper – V)
Cytology, Physiology of Bacteria and Virology

Day and Date : Thursday, 21-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. :   i) **All** questions are **compulsory**.
     ii) Figures to the **right** indicate **full** marks.
     iii) **Draw** neat labelled diagram **wherever** required.

1. Rewrite the sentences by choosing correct answer from the alternatives given below :   **10**

   1) Phospholipids are main components of _____
     a) Cell membrane   b) Pili   c) Flagella   d) Spore

   2) Initial phase of growth in which there is no increase in cell number is called _____
     a) Log   b) Death   c) Lag   d) Stationary

   3) Group translocation plays role in transport of _____
     a) Lipids   b) Sugars   c) Lipoproteins   d) Phospholipids

   4) The first amino acid in tetrapeptide side chain is mostly _____
     a) D-alanine   b) D-glutamic acid
     c) L-glutamic acid   d) L-alanine

   5) Carboxysomes are involved in _____activity.
     a) CO_2 evolution   b) Photosynthesis
     c) CO_2 fixation   d) Nitrification

   6) _____ virus adsorbs to the host with the help of tail and tail fibres.
     a) HIV   b) TMV   c) Hepatitis   d) T_4

   7) _____ granules are called sudanophilic granules.
     a) PHB   b) Volutin   c) Starch   d) Sulfur

8) Response of bacteria towards chemical stimulus is called _____
   a) Magnetotaxis   b) Aerotaxis   c) Phototaxis   d) Chemotaxis

9) Lipid A, R-core region and O side chain are components of _____
   a) Phospholipid   b) Lipopolysaccharide
   c) Glycolipid   d) Peptidoglycan

10) Peptidoglycan is absent _____
   a) Halobacterium   b) E-coli
   c) Lactobacillus   d) Salmonella

2. Answer **any five** of the following :   **10**
   i) Define growth rate.
   ii) Define sex pili.
   iii) Lipoprotein.
   iv) Define photoreactivation.
   v) Define thermophile with example.
   vi) Lag phase.

3. A) Answer **any two** of the following :   **6**
   i) Teichoic acid
   ii) Chlorobium vesicles
   iii) Structure of T_4 phase.
   B) Structure of endospore.

4. Answer **any two** of the following :   **10**
   i) Describe Turbidostata chemostat.
   ii) Explain active transport.
   iii) PHB and volutin granules.

5. Answer **any two** of the following :   **10**
   i) Effect of U.V. light on growth of Merges.
   ii) Substrate level phosphorylation.
   iii) Mechanism of enzyme action.

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Seat No.

B.Sc. – II (Semester – III) (Old) Examination, 2016
ELECTRONICS
Pulse and Switching Circuits (Paper – VI)

Day and Date : Friday, 22-4-2016　　　　　　　　　　Total Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　 2) Draw neat diagrams **wherever** necessary.
　　　　　　　　 3) Figures to the **right** indicate **full** marks.
　　　　　　　　 4) Use of log-table and calculator is **allowed**.

1. Select correct alternative from the following : 　　　　　　　　**10**

　1) The Clamper circuit is used to _____
　　a) Introduce a dc level to ac signal
　　b) Suppress variations in amplitude of the input signal
　　c) Obtain an output which is integral of the input signal
　　d) None of the above

　2) The sweep speed of a simple RC circuit is given by _____
　　a) I/C　　　　b) I.t/L　　　　c) T_s/RC　　　　d) $V.T_s/RC$

　3) If the input to a differentiating circuit is a triangular wave, then the output will be _____
　　a) Square wave　　　　　　　b) Rectangular wave
　　c) Sawtooth　　　　　　　　 d) None of the above

　4) IC74121 can be used as a _____
　　a) Decoder　　b) Multiplexer　　c) Multivibrator　　d) Memory

　5) In monostable multivibrator using BJT, the timing components are $47\,k\Omega$ and $0.01\,\mu F$ then the gate width obtained will be _____
　　a) 32 μsec　　b) 3.2 msec　　c) 32 msec　　d) 0.32 msec

　6) As per functional block diagram of IC 555 _____ flip flop is used.
　　a) D　　　　b) JK　　　　c) RS　　　　d) All of the above

P.T.O.

7) A bistable multivibrator _____

   a) has two stable states

   b) has two unstable states

   c) oscillates between two stable states without any trigger pulse

   d) is used for generating square wave

8) A transistor used as a switch is operated in

   a) active region   b) cut off region

   c) saturation region   d) cut off and saturation region

9) In astable multivibrator, if the period of the wave is twice to that of gate width the duty cycle is

   a) 100 %   b) 75%   c) 50%   d) 25%

10) Pulsewidth of monostable multivibrator using IC555 is given by _____

   a) $W = 1.1\,RC$ b) $W = 0.11\,RC$ c) $W = 11\,RC$ d) $W = \dfrac{1}{11\,RC}$

2. Attempt **any five** of the following :   **10**

   i) Explain need of wave shaping circuit.

   ii) Define following terms with reference to time base signal.

      1) Sweep time   2) Flyback time

   iii) Draw the circuit diagram of astable multivibrator using NAND gates.

   iv) What is the frequency of an astable multivibrator having components of $R_1 = R_2 = R = 10\,k\Omega$ and $C_1 = C_2 = C = 100\,PF$?

   v) Draw the circuit diagram of positive clipper with input output waveforms.

   vi) Draw the circuit diagram of voltage controlled oscillator using IC 555.

3. A) Attempt **any two** of the following : **6**

   i) Show how an RC circuit can be used as integrator.

   ii) Explain working of monostable multivibrator using IC 74121.

   iii) Explain general features of time base signals.

  B) An IC 555 timer connected in astable mode of operation, for which $R_A = 6.8\,k\Omega$, $R_B = 3.3\,k\Omega$, $C = 0.1\,\mu F$. Calculate output frequency and duty cycle of the circuit. **4**

4. Attempt **any two** of the following : **10**

   i) Describe with circuit diagram combination clipper.

   ii) Explain the use of IC 555 as a battery charger.

   iii) With neat circuit diagram, explain operation of Schmitt trigger.

5. Attempt **any one** of the following : **10**

   i) With neat circuit diagram, explain the working of UJT oscillator with constant current source. Also draw the waveforms.

   ii) Explain with neat circuit diagram the working of Miller integrator.

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Seat
No.

B.Sc. – II (Semester – III) (Old) Examination, 2016
GEOLOGY (Paper – VI)
Structural Geology

Day and Date : Friday, 22-4-2016   Total Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) **Draw** neat diagrams **wherever** necessary.
3) Figures to the **right** indicate **full** marks.

1. Write a correct answer from given four alternatives :   **10**

   1) Angle made by faults plane with vertical surface is called _____
      a) dip   b) throw   c) heave   d) hade

   2) The rock Block between two parallel normal faults is uplifted to form a ridge, is called _____
      a) Horst   b) Graben   c) Radial   d) Enechelon

   3) The highest point on the arch of an anticline is called the _____
      a) Trough   b) Crest   c) Limb   d) None of these

   4) The rock block present above the fault plane is called _____
      a) Foot wall   b) Hanging wall
      c) Heave   d) Throw

   5) Folds can be recognized in the field by studying the _____
      a) Topography   b) Drainage pattern
      c) Attitude of strata   d) All of these

   6) Limbs in the isoclinal fold are _____ to each other.
      a) Parallel   b) Perpendicular
      c) Inclined   d) Tangential

   7) Major breaks in sedimentation are called _____
      a) Confirmable   b) Unconformities
      c) Stratification   d) None of these

P.T.O.

8) A series of faults that have the same strike and dip are called the _____
   a) Parallel faults
   b) Gravity faults
   c) Oblique slip fault
   d) Tension fault

9) Columnar joints are the result of _____ of Basic lava.
   a) Release
   b) Cooling
   c) Expansion
   d) Shearing

10) Subsurface rock beds is to be studied by _____
   a) Drilling
   b) Mining
   c) Geophysical method
   d) All of these

2. Solve **any five** of the following :   **10**
   1) What is foliation ?
   2) Define Joints.
   3) Overlap.
   4) What is Limb in fold ?
   5) Define Axial plane.
   6) Define heave of fault.

3. A) Solve **any two** of the following :   **6**
   1) Explain Lineation.
   2) Explain Outliers.
   3) Explain Inliers.

   B) Write note on :
   How to determine width of outcrop ?   **4**

4. Write **any two** of the following :   **10**
   1) Explain criteria for the recognition fold in the field.
   2) Explain genetic classification of Joints.
   3) Explain any two types of faults.

5. Write **any two** of the following :   **10**
   1) Explain concept of Plate tectonics.
   2) Explain recognition of unconformities in the field.
   3) Explain any two types of unconformities.

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Seat
No.

B.Sc. II (Semester – III) (Old) Examination, 2016
MICROBIOLOGY
Paper – VI : Bacterial Genetics

Day and Date : Friday, 22-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences by selecting correct answers from given
   alternatives :   **10**

   i) _____ bond connects a nitrogen base and the deoxyribose sugar in DNA
      molecule.
      a) Peptide   b) Hydrogen   c) Glycosidic   d) Phosphodiester

   ii) The initiation codon is represented as
       a) UAA   b) UAG   c) AUG   d) UGA

   iii) The A form of DNA contains _____ no. of bases.
        a) 11   b) 10   c) 9   d) 8

   iv) The maleness to bacteria is due to presence of _____ plasmid.
       a) R   b) Col   c) Ti   d) F

   v) Hydroxylamine reacts specifically to _____ to convert it to hydroxylaminouracil.
      a) Guanine   b) Cytosine   c) Uracil   d) Thymine

   vi) Lederberg and Lederberg has developed _____ technique.
       a) Pure culture   b) Replica plate   c) Pour plate   d) Crowded

   vii) _____ phage mediates restricted transduction.
        a) λ b) P_1 c) P_{22} d) T_4

   viii) The donor in the process of transfection is _____ molecule.
         a) Plasmid   b) ds DNA   c) Phage   d) Exon

P.T.O.

ix) The smallest unit that is undergoing mutation is known as

    a) Muton   b) Cistron   c) Recon   d) Exon

x) The development of competence is a feature of _____ process.

    a) Conjugation   b) Transduction

    c) Transformation   d) Transfection

2. Write in short (**any five**) :   **10**

  i) Describe C form of DNA.

  ii) Define genome.

  iii) What is photoreactivation ?

  iv) Define interrupted genes.

  v) What are Hfr cells ?

  vi) What is genetic code ?

3. A) Write in short (**any two**) :   **6**

    i) Describe effect of alkylating agents.

    ii) Write on fate of exogenote.

    iii) Describe effect of 2-aminopurine.

  B) Write on abortive transduction.   **4**

4. Write on **any two** :   **10**

  i) Describe chemical structure and nature of bacterial DNA.

  ii) Describe properties of genetic code.

  iii) Describe the process of generalised transduction in bacteria.

5. Write on **any two** :   **10**

  i) Describe physical properties of B form of DNA by drawing neat labelled diagram.

  ii) Describe the process of transformation in bacteria.

  iii) What are plasmids ? Write their properties.

_____

SLR-W – 91

N.B. : i) **All** questions are **compulsory.**

ii) **Draw** neat diagrams and give equations **wherever** necessary.

iii) Figures to the **right** indicate **full** marks.

iv) **Use** of logarithmic tables and scientific calculator is **allowed**.

(At.wts. H = 1, C = 12, O = 16, N = 14, Na = 23, Cl = 35.5)

1. Choose the most correct alternative and rewrite the sentence :   **10**

   1) Specific conductance is the reciprocal of

      a) Conductance   b) Specific resistance

      c) Resistance   d) Equivalent conductance

   2) [111] plane of a crystal is called as _____ plane.

      a) Diagonal   b) Cube-diagonal

      c) Simple   d) None of the above

   3) The SI Unit of entropy is

      a) cm^{-1} b) m^{-1}

      c) $J.K^{-1}$ d) $Cal.mol^{-1}$

P.T.O.

4) The molecule in which effective centers of +ve and –ve charges coincide is known as _____
   a) Polar
   b) Non-polar
   c) Active
   d) None of these

5) Electric current is carried in the solution by
   a) Atoms
   b) Molecules
   c) Electrons
   d) Ions

6) The entropy change in an isothermal irreversible process, entropy change is _____
   a) Less than zero
   b) Greater than zero
   c) Equal to zero
   d) None of these

7) If transport number of Ag^+ is 0.47, then that of $NO_3^- = $ _____
   a) 0.48
   b) 0.53
   c) 1.0
   d) 0.053

8) Three dimensional arrangement points in space is called _____
   a) Crystal structure
   b) Unit cell
   c) Crystal lattice
   d) Lattice plane

9) H_2O and H_2S have finite values of dipole moment hence their structures should be
   a) Angular
   b) Linear
   c) Non-linear
   d) None of these

10) One faraday is equal to _____
    a) 96.500 coulomb
    b) 96500 coulomb
    c) 9.6500 coulomb
    d) 9650.0 coulomb

2. Answer **any five** of the following : **10**

   i) Define the term molecular conductance.

   ii) Define the term specific refractivity.

   iii) Explain center of symmetry.

   iv) What are conductors ?

   v) What is absolute entropy ?

   vi) State Kohlrausch's law.

3. A) Answer **any two** of the following : **6**

   i) Explain how are the specific and equivalent conductances related to each other.

   ii) Explain how the use of dipole moment helps in the study of cis and trans isomers.

   iii) Write a precise note on migration of ions.

   B) Calculate the entropy change involved in the isothermal reversible expansion of 5 moles of an ideal gas from a volume of 5 dm^3 to a volume of 40 dm^3 at 300K. (R = 8.314 J mol^{-1}). **4**

4. Answer **any two** of the following : **10**

   i) Describe the factors affecting transport number.

   ii) State and explain the law of crystallography.

   iii) Define dipole moment. Discuss the application of dipole moment in the determination of structure of benzene.

5. Answer **any two** of the following : **10**

   i) Define entropy. Give its physical significance.

   ii) State Kohlrausch law. Explain its importance in the determination of solubility of sparingly soluble salts.

   iii) Describe the structure of NaCl on the basis of Bragg's equation.

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Seat No.	

B.Sc. – II (Semester – IV) (Old) Examination, 2016
COMPUTER SCIENCE
Paper – VII : Data Structures

Day and Date : Saturday, 23-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N. B. : 1) **All** questions are **compulsory**.
           2) Figures to the **right place** indicate **full** marks.

1. Choose correct alternatives :   **10**

   1) _____ is primitive data structure.

     a) Stack   b) Queue   c) Tree   d) None of these

   2) _____ data structure is used in simulation application.

     a) Stack   b) Queue   c) Linked list   d) Tree

   3) To implement _____ sort method, queue data structure is used.

     a) Bubble   b) Insertion   c) Quick   d) Radix

   4) Maximum comparing search key with elements arise fast searching process.

     a) True   b) False

   5) Linked list is flexible than stack and queue.

     a) True   b) False

   6) _____ node in a tree that does not have any ancestors.

     a) Leaf   b) Terminal   c) Root   d) External

   7) Bubble sort requires _____ maximum comparisons to sort 7 elements.

     a) 21   b) 25   c) 31   d) 35

   8) _____ searching requires data to be sorted first.

     a) Linear   b) Binary   c) Sequential   d) Hashing

9) If preorder traversal of binary tree is ZPSQRTU then its post order is _____

    a) SRPQUTZ   b) SRQPTUZ   c) SQRPUTZ   d) SRQPUTZ

10) Stack is LIFO data structure.

    a) True   b) False

2. Answer **any five** of the followings :   **10**

    1) What is Data structure ?

    2) Why queue is called FIFO data structure ?

    3) What is drawback of sequential access ?

    4) Define : 'Sorting' and 'Searching'.

    5) Define : 'Multi-dimensional array'. Write its declaration syntax.

    6) Write working of PUSH() and POP() operations of stack.

3. A) Attempt **any two** of the followings :   **6**

    1) Explain priority queue in details.

    2) Write algorithm to search node in binary search tree.

    3) Write a program that reverses each element of one dimensional array.

  B) Write a program to implement insertion sort method.   **4**

4. Answer **any two** of the followings :   **10**

    1) Define "Doubly circular linked list" and implement the function that reverses it .

    2) Write a program which converts infix expression into postfix form.

    3) What is ADT ? Explain ADT for 'Queue' data structure.

5. Answer **any two** of the followings :   **10**

    1) What is Traversal ? Explain tree traversal methods in details.

    2) Write a program to implement linear queue.

    3) What is Hashing ? Explain different Hash functions.

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Seat No.

B.Sc. II (Semester – IV) (Old) Examination, 2016
CHEMISTRY
Analytical and Industrial Inorganic Chemistry (Paper – VIII)

Day and Date : Monday, 25-4-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
         2) Draw **neat** labelled diagram and give equations **wherever** necessary.
         3) Figures to the **right** indicate **full** marks.

1. Select the most correct alternative and rewrite the following sentences :   **10**

   1) A chemical reaction between a titrant and titrand is called as
      a) End point   b) Titration curve
      c) Titration   d) Titrand

   2) Activated sludge process belongs to _____ treatment.
      a) Pre-primary   b) Primary   c) Tertiary   d) Secondary

   3) Digestion is nothing but process of
      a) Ageing   b) Ignition   c) Nucleation   d) Coagulation

   4) The optimum temperature for maximum yield of H_2SO_4 by contact process is
      a) 300 to 450°C   b) 400 to 450°C   c) 600 to 700°C   d) 500 to 550°C

   5) Methyl orange is a _____ organic base.
      a) Strong   b) Weak   c) Medium   d) Suitable

   6) _____ increase the efficiency of catalyst.
      a) Reactant   b) Product   c) Temperature   d) Promoter

   7) Sedimentation is a _____ process.
      a) Settling   b) Chemical   c) Biological   d) Coagulation

   8) The process of forming a precipitate is known as
      a) Precipitation   b) Coagulation   c) Peptization   d) Flocculation

9) Ionic theory of indicator of acid-base indicator was proposed by
   a) Arrhenius   b) Ostwald
   c) Bronsted Lowry   d) Pearson

10) For the production of good yield of SO_3 from SO_2 the proportion of $O_2 : SO_2$ is
    a) 1 : 3   b) 3 : 1   c) 1 : 1   d) 3 : 2

2. Answer **any five** of the following :   **10**
   i) Give the structure of Eriochrom Black – T.
   ii) Define alloy steel.
   iii) What is chlorination ?
   iv) Draw neat labelled diagram of manufacturing plant for ammonia by Haber's process.
   v) Give any two uses of catalyst in industrial process.
   vi) What is metal ion indicator ?

3. A) Answer **any two** of the following :   **6**
      i) What are the types of EDTA titration ? Explain direct titration.
      ii) What is heterogeneous catalysis ? Give two examples.
      iii) Explain any two heat treatment process on steel.

   B) Explain the effect of catalyst and concentration on the yield of ammonia by Haber's process.   **4**

4. Write short note on **any two** of the following :   **10**
   i) L.D. Process
   ii) Types of water pollutants
   iii) Characteristics of catalytic reaction.

5. Answer **any two** of the following :   **10**
   i) What is potable water ? Explain removal of suspended matter by
      i) Prolonged storage   ii) Screening and   ii) Sedimentation
   ii) Give merits of organic precipitants.
   iii) With the help of neutralization curve explain the choice of indicator for titration of weak acid and strong base.

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SLR-W – 95

Seat No.

B.Sc. (Part – II) (Semester – IV) Examination, 2016
PHYSICS
Paper No. – VII : Optics (Old)

Day and Date : Tuesday, 26-4-2016

Time : 10.30 a.m. to 12.30 p.m.　　　　　　　　　　　Max. Marks : 50

Instructions *:　i)　**All** questions are **compulsory**.*

　　　　　　*ii)　Figures to the **right** indicate **full** marks.*

　　　　　　*iii)　**Neat** diagrams must be drawn **wherever** necessary.*

　　　　　　iv)　Use of logarithmic table and calculator is allowed.

　　　　　　v)　Answer to every question must begin on a new page.

1.　Select and write the most appropriate answer from the given alternatives for each sub-question.　　　　　　　　　　　　　　　　　　**10**

　 i)　The total number of cardinal points an optical system have

　　　　a) Three　　　　　　b) Four　　　　　　c) Five　　　　　　d) Six

　 ii)　An angle of inclination with the direction of incident beam of glass plates used in Michelson's interferometer is

　　　　a) 80°　　　　　　b) 60°　　　　　　c) 45°　　　　　　d) 30°

　 iii)　Resolving power of F.P. Interferometer as compared with Michelson's interferometer is

　　　　a) Smaller　　　　　　　　　　b) Much more smaller

　　　　c) Higher　　　　　　　　　　d) Very much higher

　 iv)　The area of nth Fresnel's half period zone is given by

　　　　a) $\pi b \lambda$　　　　b) $2\pi b \lambda$　　　　c) $3\pi b \lambda$　　　　d) $n\pi b \lambda$

　 v)　Resolving power of a plane diffraction grating with 'N' number of lines for n^{th} order is

　　　　a) $\dfrac{N}{n}$　　　　b) $\dfrac{n}{N}$　　　　c) nN　　　　d) 2nN

P.T.O.

vi) Quarter wave plate produces a phase difference between the emergent 'E' and 'O' components of light

a) $\dfrac{\pi}{4}$ b) $\dfrac{\pi}{2}$ c) π d) 2π

vii) If V_e is velocity of extra-ordinary light and V_o is velocity of ordinary light then along the optic axis of a crystal

a) $V_e > V_o$ b) $V_e < V_o$ c) $V_e = V_o$ d) $V_e = 2V_o$

viii) Refractive index of core material is 'n_1' refractive index of cladding material is 'n_2'. For an optical fibre

a) $n_1 > n_2$ b) $n_1 < n_2$ c) $n_1 = n_2$ d) $n_1 = \dfrac{n_2}{2}$

ix) The distance of an object and its image from the corresponding focal points are 9 cm and 4 cm respectively for a thick lens in air. Focal length of this thick lens is

a) 3 cm   b) 6 cm   c) 9 cm   d) 12 cm

x) The radius of the first Fresnel's half period zone required to focus parallel beam of light of wavelength 5000 $\overset{\circ}{A}$ at distance 2m away is

a) 10^{-3} m   b) 10^{-2} m   c) 10^{-1} m   d) 10 m

2. Answer **any five** of the following :   **10**

   i) For a refracting optical system, state Lagrange's equation of magnification.

  ii) What is a Sharpness of fringes ?

 iii) State the two points of comparison between zone plate and convex lens.

 iv) What is a condition for geometrical resolution ?

  v) State any two applications of an optical fibre.

 vi) Calculate the thickness of a half wave plate for the light of wave length 5890 $\overset{\circ}{A}$. (Given $\mu_0 = 1.55$, $\mu_e = 1.5$).

3. A) Answer **any two** of the following : **6**

   i) What is a zone plate ? How it is constructed ?

   ii) What are consonance and dissonance in Michelson's interferometer ?

   iii) A doublet of the sodium source of light having components : $5896 \overset{\circ}{A}$ and $5890 \overset{\circ}{A}$. Find the minimum number of lines necessary for a plane diffraction grating to resolve this doublet in the second order.

   B) For an optical fibre, define the following terms : **4**

   a) Pulse dispersion.

   b) Numerical aperture.

4. Answer **any two** of the following : **10**

   i) Explain the construction and working of Fabry-Perot interferometer.

   ii) Derive an expression for resolving power of a prism.

   iii) In an experiment of Fresnel's diffraction at straight edge, the point source of light of wavelength $6000 \overset{\circ}{A}$ and screen are at distance 5 m and 2 m away from the edge of an obstacle respectively. Calculate the position of the first two points of minimum intensity and their separation.

5. Answer **any one** of the following : **10**

   i) For an optical system, derive the relationship between the focal lengths and refractive indices.

   ii) Describe an experiment of a polarimeter to determine the specific rotation of an optically active solution.

   A 20% sugar solution is taken in the tube of polarimeter of length 20 cm rotates the plane of polarisation of light through 24°. Calculate the specific rotation of sugar.

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Seat No.

B.Sc. – II (Semester – IV) Examination, 2016
BIOCHEMISTRY
Paper – III : Nutrition and Metabolism (Old)

Day and Date : Tuesday, 26-04-2016　　　　　　　　　Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

N.B. : 1) **All** questions are **compulsory**.

2) Figures to the **right** indicate **full** marks.

3) Write biochemical reactions **wherever** necessary.

1. Write following substances selecting most correct answer from given options.　**10**

    1) Cobalt is a component of Vitamin

        a) B_1　　　　　b) B_2　　　　　c) B_6　　　　　d) B_{12}

    2) Du Bois formula is used to findout _____ of an individual.

        a) Weight　　　　　　　　　b) Height

        c) Body surface area　　　　　d) Age

    3) One mole of ATP on hydrolysis to ADP produces _____ Kilocalories of energy per mole.

        a) 2.2　　　　　b) 6.8　　　　　c) 7.3　　　　　d) 11.8

    4) In a respiratory chain succinate gives its electrons to

        a) NAD^+　　　b) CoQ_{10}　　　c) Cytochrome c.　d) FAD

    5) The end product of Krebs' cycle is

        a) Oxaloacetate　b) $CO_2 + H_2O$　c) Citrate　　　　d) Pyruvate

    6) Biosynthesis of glycogen from glucose is called

        a) Gluconeogenesis　　　　　b) Glycolysis

        c) Glycogenesis　　　　　　　d) Glycogenolysis

    7) _____ is an unusual amino acid involved in urea cycle.

        a) Ornithine　　　　　　　　b) Arginine

        c) Aspartic acid　　　　　　　d) Glycine

8) Acetyl CoA formed during β-oxidation of fatty acids is generally
   a) Further metabolised by TCA cycle
   b) Excreted through urine
   c) Remains circulating in blood
   d) Converted back to triglycerides

9) pH of human blood is maintained in the range _____ ± 0.05.
   a) 6.8 b) 7.4 c) 8.2 d) None of these

10) Antidiuretic hormone increases reabsorption of _____ by renal tubules.
   a) Na^+ b) Glucose c) Water d) Phosphate

2. Answer **any five** from below : **10**
   1) In general which tissue is affected due to lack of water soluble vitamins in diet ? Why ?
   2) Differentiate between mineral salts and trace elements used in nutrition. Give two examples of each.
   3) What is negative nitrogen balance in nutrition ? What is its effect ?
   4) When the process of glycogenolysis takes place ? Name its substrate and product.
   5) What happens to the ammonia formed by deamination of amino acids ?
   6) What are the functions of water in the body ?

3. A) Answer **any two** from below : **6**
   1) What is respiratory quotient ?
   2) What is role of nicotinamide nucleotide in respiratory chain ?
   3) How are acids produced by the body ?

   B) Write a note on-phenylketonuria. **4**

4. Answer **any two** : **10**
   1) Write and explain the reactions of β-oxidation of fatty acids.
   2) Write down respiratory chain and explain oxidative phosphorylation.
   3) Write and explain reactions of citric acid cycle.

5. Attempt **any two** from below : **10**
   1) Illustrate the importance of mineral salts and vitamins in diet.
   2) How is the Basal Metabolic Rate measured ?
   3) Write an account of renal mechanism of regulation of blood pH.

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Seat No.

B.Sc. – II (Semester – IV) (Old) Examination, 2016
PLANT PROTECTION (Paper – III)
Introduction to Weeds and Non-Insect Pests

Day and Date : Tuesday, 26-4-2016　　　　　　　　　　Total Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions :　1) **All** questions are **compulsory**.
　　　　　　　　　2) **Draw** neat and labelled diagrams **wherever** necessary.
　　　　　　　　　3) Figures to the **right** indicate **full** marks.
　　　　　　　　　4) **All** questions carry **equal** marks.

1. Rewrite the sentences by choosing the correct alternative :　　　　**(1×10=10)**

　1) Mites and Rats are the _____ pests.
　　a) Non-insect　　b) Insect　　c) Parasitic　　d) Both b) and c)

　2) _____ are the non-insect pests.
　　a) Mites　　　　b) Birds　　　c) Snails　　　d) All the above

　3) _____ is an examples of weedicides.
　　a) Gendimethalin　　　　　　b) Dendimethalin
　　c) Pendimethalin　　　　　　d) Wendimethalin

　4) Classification of weedicides is based on _____
　　a) Chemical nature　　　　　b) Mode of action
　　c) Range of effectiveness　　d) All the above

　5) Weed management by _____ is the method of biological control.
　　a) Insects　　　b) Virus　　　c) Bacteria　　d) All the above

　6) Ploughing is the _____ methods of weed management.
　　a) Biological　　b) Cultural　　c) Physical　　d) Mechanical

　7) English name of *Argemone* is _____
　　a) Prickly poppy　　　　　　b) Wrickly poppy
　　c) Opium poppy　　　　　　d) Poppy

P.T.O.

8) *Parthenium hysterophorus* reproduces by _____
   a) Grafts   b) Seeds   c) Cuttings   d) Spores

9) _____ weeds belong to study of special weeds.
   a) Poisonous   b) Non-poisonous
   c) Insecticides   d) Pesticides

10) Classification of weeds is mainly based on _____
   a) Mycology   b) Cytology   c) Ecology   d) Physiology

2. Answer **any five** of the following :   **(2×5=10)**
   i) Define crop association.
   ii) What is weed ?
   iii) What is reproduction ?
   iv) Define sanitation.
   v) Give the use of 2,4-D.
   vi) Write reproduction of *Cynodon dactylon*.

3. A) Answer **any two** of the following :   **(2×3=6)**
      i) Give the losses caused by weeds.
      ii) Explain the biological methods of weed management.
      iii) Write the ecology of *Euphorbia hirta*.

   B) Explain the morphology, reproduction and control of *Argemone maxicana*.   **4**

4. Answer **any two** of the following :   **(2×5=10)**
   i) Explain the nature of damage and their management by snail and slugs.
   ii) Describe any two aquatic weeds w.r.to morphology and reproduction.
   iii) Write any two cultural methods of weed management.

5. Answer **any two** of the following :   **(2×5=10)**
   i) Explain the formulation and use of Alachlor (Lasso 50 E.C.) Weedicides.
   ii) Give the field sanitation and cover crops methods of weed management.
   iii) Explain the Mites as non-insect pests w.r.to damage and management.

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Seat No.

B.Sc. – II (Semester – IV) (Old) Examination, 2016
PHYSICS (Paper – VIII)
Modern Physics

Day and Date : Wednesday, 27-4-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. :   i) **All** questions are **compulsory**.
       ii) Figures to the **right** indicate **full** marks.
       iii) **Use** of log tables and calculators is **allowed**.
       iv) **Neat** diagrams must be drawn **wherever** necessary.

1. Select the correct alternative from the following :   **10**

   i) The special theory of relativity was developed by

     a) Isaac Newton   b) Galileo

     c) Michelson and Morley   d) Albert Einstein

   ii) Relativity involves the relation between

     a) Space and time

     b) Mass and energy

     c) Space and time as well as mass and energy

     d) Mass and time

   iii) Radiation exhibits _____ nature.

     a) only particle   b) dual

     c) only wave   d) mechanical wave

   iv) If the particle velocity is $\dfrac{C}{2}$, then the phase velocity of the wave associated with the particle is

     a) $\dfrac{C}{2}$ b) 2C   c) $\dfrac{2}{C}$ d) $\dfrac{C}{4}$

v) The magnitude of spin quantum number is always

   a) 1   b) $\dfrac{1}{2}$ c) $-\dfrac{1}{2}$ d) 0

vi) _____ experiment proves the spin associated with electron.

   a) Zeeman effect   b) Stark effect

   c) Compton effect   d) Stern and Gerlach

vii) The magnitude of Compton wavelength is

   a) 0.0242 A°   b) 0.0484A°   c) 1A°   d) 0.200A°

viii) The phenomenon in which the frequency or wavelength of incident x-ray photon changes due to scattering is known as

   a) Zeeman effect   b) Photoelectric effect

   c) Raman effect   d) Compton effect

ix) The energy released in a every fission of uranium nucleus (U^{235}) is about

   a) 100 MeV   b) 200 MeV   c) 200 KeV   d) 500 MeV

x) Apsara, Zerlina, Cirus, Dhruva, Kamini are the names of the

   a) Stars   b) Electronic devices

   c) Nuclear reactors   d) New elements

2. Attempt **any five** :   **10**

   i) What are inertial and noninertial frames of references ?

   ii) State the Einstein's postulates of special theory of relativity.

   iii) Define the particle velocity and phase velocity.

   iv) State Pauli's exclusion principle.

   v) What is a chain reaction ?

   vi) What is L.S. coupling ?

3. A) Answer **any two** of the following :   **6**

   i) Explain how Bohr's quantum condition for atomic structure can be obtained on the basis of matter waves.

   ii) What is Zeeman effect ? Explain in short normal and anomalous Zeeman effect.

   iii) Discuss in short about atomic energy programme in India.

   B) A one meter rod is kept in a satellite with its length along the direction of motion. If the satellite has velocity 0.8C. Calculate the length of the rod as measured by an observer a) in the satellite, and b) in the stationary laboratory.   **4**

4. Attempt **any two** of the following :   **10**

   i) Explain De Broglie's concept of matter waves and hence write down the properties of matter waves.

   ii) How Compton effect is verified experimentally ?

   iii) What are the basic elements of nuclear reactor ? Draw a labelled diagram of a nuclear reactor illustrating its general scheme.

5. Attempt **any one** of the following :   **10**

   i) Obtain an expression for variation of mass with velocity.

   ii) Explain space quantization and spin of electron. Hence describe the quantum numbers associated with vector atom model.

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Seat No.

B.Sc. II (Semester – IV) (Old) Examination, 2016
BIOCHEMISTRY (Paper – IV)
Molecular Biochemistry and Diseases

Day and Date : Wednesday, 27-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. : 1) Figures to the **right** indicate **full** marks.
      2) **All** questions are **compulsory**.
      3) Draw neat diagrams **wherever** necessary.

1. Write following sentences selecting most correct answer from given options. **10**

   1) In DNA amount in mole of guanine is equal to amount of _____
     a) adenine   b) thymine   c) cytosine   d) uracil

   2) The linkage between sugar and base in nucleic acid is _____ linkage.
     a) Phosphodiester   b) N-β glycosidic
     c) Peptide   d) Amide

   3) DNA replication is semiconservative was demonstrated by _____
     a) Watson and Crick   b) Jacob and Manod
     c) Meselson and Stahl   d) Okazaki

   4) Transcription means biosynthesis of _____
     a) DNA   b) RNA   c) Protein   d) Polysaccharide

   5) _____ amino acids have a single code word each.
     a) 2   b) 3   c) 4   d) 6

   6) Coordinated unit of genetic expression and control in bacteria is called as _____
     a) Cistron   b) Constitutive gene
     c) Operon   d) Operator gene

P.T.O.

7) Antibody binding site of IgG is present on _____ part of its polypeptide chains.
   a) Variable
   b) Constant
   c) Only light chains
   d) Only heavy chains

8) Mature insulin molecule contains _____ interchain disulphide bridges.
   a) 2
   b) 3
   c) 4
   d) 5

9) HIV affects primarily _____ system of body and destroys it.
   a) circulatory
   b) nervous
   c) immune
   d) muscular

10) Didanosin drug used in AIDS is _____ drug.
   a) protein inhibitor
   b) nucleoside analogue
   c) C-AMP suppressor
   d) membrane transport inhibitor

2. Answer **any five** from below :   **10**
   1) What is bacterial lawn ?
   2) How is a child immunised by his mother ?
   3) Which cells are affected by HIV infection ?
   4) Draw a schematic structure of insulin.
   5) Name various carcinogenic substances.
   6) What is immune memory ?

3. A) Solve **any two** :   **6**
   1) How are antibodies formed according to clonal selection theory ?
   2) Explain the mechanism of action of AZT (azidothymidine) on HIV.
   3) Illustrate the terms-nuclear bases, nucleosides and nucleotides.

   B) Draw a labelled diagram of HIV.   **4**

4. Answer **any two** from below :   **10**
   1) State and explain salient features of genetic code.
   2) What is lac operon ? How does it functions ?
   3) Discuss-λ-(Lambda) phage as a cloning vector.

5. Attempt **any two** :   **10**
   a) Describe the structure of immunoglobulin G. (IgG).
   b) Write an account of different types of acquired immunity.
   c) How preproinsulin is converted to active insulin ?

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Seat No.

B.Sc. (Part – II) (Semester – IV) (Old) Examination, 2016
PLANT PROTECTION
Paper – IV : Insect Pest and Their Management

Day and Date : Wednesday, 27-4-2016
Time : 2.30 p.m. to 4.30 p.m.

Max. Marks : 50

Instructions : i) **All** questions are **compulsory**.
ii) Draw **neat** and labelled diagrams **wherever** necessary.
iii) Figures to the **right** indicate **full** marks.

1. Rewrite the sentences by selecting correct answer from the given alternatives. **10**

1) _____ is the pest of stored grains.
   a) Jassid b) Pulse bettle c) Fruit borer d) Thrip

2) _____ is the most serious pest of gram.
   a) Cut worm b) Stem borer c) Pod borer d) Red spider

3) _____ is the plant origin insecticide.
   a) DDT b) Pongram c) Carbofuran d) Diazinon

4) A chemical or physical source which induces insects to move towards it is called
   a) Attractant b) Repellent
   c) Antifeedant d) Chemosterilant

5) _____ is the pest of tomato.
   a) Wooly aphid b) Fruit borer c) Stem borer d) Red spider

6) _____ is used as contact poison obtained from tobacco plant.
   a) Nimbin b) Nimbidine c) Nicotine d) Pyrethrin

7) <u>Holotricha consanguinea</u> is the scientific name of
   a) White grub b) Wooly aphid
   c) Mango jassid d) Brinjal fruit borer

8) _____ are insect pests.
   a) Birds b) Snails c) Rats d) Aphids

9) _____ is the pest of sugarcane.
   a) White grub b) Fruit borer c) Wooly aphid d) Pod borer

10) There are _____ stages in the life cycle of insect.
    a) 2 b) 3 c) 4 d) 5

P.T.O.

2. Answer **any five** of the following :   **10**

   i) Give the nature of damage caused by white grub.

   ii) Give the marks of identification of Red Spider.

   iii) What are the pheromones ?

   iv) What you know about microbial insecticides ?

   v) Give the mouth parts of pod borer.

   vi) Give the host range of thrips.

3. A) Answer **any two** of the following :   **6**

   i) What is the effect of insecticides on the respiratory and nervous system of insect ?

   ii) Give the host range and damage caused by pulse bettle.

   iii) State the stomach insecticides.

  B) Give the life cycle of wooly aphid.   **4**

4. Answer **any two** of the following :   **10**

   i) Describe the different principles of pest control.

   ii) Explain the general characters of typical insect w.r.t. wings and types of legs.

   iii) Give the nature of damage and management of mango jassid.

5. Answer **any two** of the following :   **10**

   i) Give the classification of insect pests based on mouth parts.

   ii) Give an account of Jowar stem borer w.r.t. scientific name, marks of identification and management.

   iii) Describe the life cycle of rice weevil and give its management.

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SLR-W – 101

B.Sc. – II (Semester – IV) (Old) Examination, 2016
STATISTICS (Paper – VII)
Continuous Probability Distributions – II

Day and Date : Thursday, 28-4-2016　　　　　　　　　　　Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N. B. :　*i)* **All** *questions are* **compulsory** *and carry* **equal** *marks.*
　　　　ii) *Figures to the* **right** *indicate* **full** *marks.*

1. Choose the correct alternative :　　　　　　　　　　　　　　　　**10**

　　i) Gamma distribution is
　　　　a) Negatively skewed　　　　　　b) + vely skewed
　　　　c) Mesokurtic　　　　　　　　　　d) None of these

　　ii) Points of inflexion of normal probability curve are
　　　　a) $(\mu - \sigma, \mu + \sigma)$
　　　　b) $(\mu - 2\sigma, \mu + 2\sigma)$
　　　　c) $(\mu - 3\sigma, \mu + 3\sigma)$
　　　　d) None of these

　　iii) Let $X \sim N(\mu, \sigma^2)$, then the values of the coefficients of β_1 and β_2 are
　　　　a) (0, 1)　　　　　　　　　　　　b) (0, 3)
　　　　c) (μ, σ^2)　　　　　　　　　d) None of these

　　iv) Suppose X follows student's 't' distribution with n d.f. then Var(X) =
　　　　a) $\dfrac{n-2}{n}$　　　　　　　　　　b) $-n-2$

　　　　c) $\dfrac{n}{n-2}$　　　　　　　　　　d) None of these

　　v) If $t \sim t_n$ then the variate t^2 follows
　　　　a) F(n, 1)　　　　　　　　　　　b) F(1, n)
　　　　c) F(n, n)　　　　　　　　　　　d) None of these

vi) If $z \sim N(0, 1)$ then $P(-2.58 < z < 2.58) =$

a) 0.95   b) 0.99   c) 0.05   d) 0.01

vii) For large λ, gamma distribution becomes

a) symmetric   b) +vely skewed

c) –vely skewed   d) none of these

viii) Let r.u. X has chi-square distribution with 'n' d.f. As n is very large, X has _____ distribution.

a) $N(\mu, \sigma^2)$ b) $N(n, 2n)$ c) $N(0, 1)$ d) None of these

ix) Mean of F distribution with 4 and 8 d.f. is

a) 4   b) $\dfrac{2}{3}$ c) $\dfrac{4}{3}$ d) None of these

x) The mode of beta distribution of first kind with (3, 4) is

a) $\dfrac{2}{5}$ b) $\dfrac{3}{7}$ c) $\dfrac{4}{7}$ d) None of these

2. Attempt **any five** of the following :   **10**

i) If $X \sim G(\alpha, \lambda)$ then show that $CX \sim G\left(\dfrac{\alpha}{C}, \lambda\right)$ where C is constant.

ii) Define chi-square variate with one d.f. and write the p.d.f. of chi-square distribution with 'n' d.f.

iii) If X is a r.v. with p.d.f.

$$f(x) = \frac{1}{2\sqrt{2\pi}} \, e^{-\frac{1}{8}(X-5)^2} \; ; -\infty < x < \infty.$$

Find i) $E(3X - 2)$ ii) $Var(2X + 5)$.

iv) If $X_1, X_2, \ldots, X_n$ are iid $N(\mu, \sigma^2)$ variables then show that $\bar{X} \sim N\left(\mu, \dfrac{\sigma^2}{n}\right)$.

v) Show that mean of 't' distribution with n d.f. is zero.

vi) Show that uniform distribution is a particular case of beta distribution of first kind.

3. A) Attempt **any two** of the following : **6**
    i) Obtain m.g.f. of chi-square distribution with n d.f.
    ii) Find the harmonic mean of beta distribution of second kind.
    iii) Obtain mode of gamma distribution with two parameters α and λ.

   B) Write an expression for $(2r)^{th}$ central moment of 't' – distribution with n degrees

   of freedom. Hence show that $\dfrac{\mu_{2r}}{\mu_{2r-2}} = \dfrac{n(2r-1)}{(n-2r)} ; r < \dfrac{n}{2}$. **4**

4. Attempt **any two** of the following : **10**
    i) Find mean and variance of the beta distribution of first kind.

    ii) Obtain mode of chi-square distribution with 'n' d.f.

    iii) If X and Y are two independent gamma variates with parameters (α, λ_1)

    and (α, λ_2) resp. Obtain the distributions of U = X + Y and V = $\dfrac{X}{Y}$.

5. Attempt **any one** of the following : **10**
    i) State and prove the relation between 't' and 'F' variates.

    ii) Obtain variance of the F-distribution with (n_1, n_2) d.f.

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Seat
No.

B.Sc. (Part-II) (Semester-IV) (Old) Examination, 2016
ZOOLOGY (Paper – VII)
Animal Diversity – IV

Day and Date : Thursday, 28-4-2016   Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

Instructions :   1) ***All*** questions are ***compulsory***.
     2) Draw ***neat*** labelled diagrams ***wherever*** necessary.
     3) Figures to the ***right*** indicate ***full*** marks.

1. Select the appropriate answer and rewrite the sentences.   **10**

    1) Rat belongs to order

      a) Squamata   b) Rodentia

      c) Synapsida   d) Rhynchocephalia

    2) Digestion in stomach is called as _____ digestion.

      a) Gastric   b) Intestinal   c) Duodenal   d) Complete

    3) Pulmonary vein curry oxygenated blood towards the

      a) Heart   b) Kidney   c) Liver   d) Intestine

    4) Presence of hairy covering on the body is found in _____ class.

      a) Amphibia   b) Reptilia   c) Aves   d) Mammalia

    5) The greenish fluid secreted by liver of rat is called

      a) Bile   b) Gastric juice   c) Saliva   d) Urine

    6) In rat _____ are non nucleated.

      a) W.B.Cs   b) R.B.Cs

      c) Blood Platelets   d) Thrombocytes

7) Poison gland in snake _____ shaped.

   a) Bean   b) Pear   c) Almond   d) Grain

8) Migration of birds from East to West and vice versa is called

   a) Longitudinal   b) Latitudinal   c) Altitudinal   d) Total

9) Pterosaurus is

   a) Mesozoic reptile   b) Poisonous snake

   c) Non poisonous   d) Semi poisonous

10) $\dfrac{2,1,2,3}{2,1,2,3}$ is dental formula of

   a) Sheep   b) Cat   c) Dog   d) Man

2. Write short notes on (**any five**).   **10**

   i) Salient features of Aves

   ii) R.B.Cs of rat

   iii) Perching feet of birds

   iv) First aid treatment of snake bite

   v) Longitudinal migration

   vi) Functions of bile.

3. A) Answer **any two** of the following.   **6**

   1) Mud probing beak of birds.

   2) Digestion in stomach of rat.

   3) Poisonous apparatus of snake.

B) Functions of brain of rat.   **4**

4. Answer **any two** of the following.   **10**

   1) Describe internal ear of rat.

   2) Monotreames.

   3) Describe dentition in human.

5. Answer **any one** of the following.   **10**

   1) Describe excretory system of rat and add note on process of excretion.

   2) Describe different mesozoic reptiles.

_____

Seat
No.

B.Sc. II (Semester – IV) (Old) Examination, 2016
STATISTICS (Paper – VIII)
Applied Statistics

Day and Date : Friday, 29-4-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions :   1) **All** questions are **compulsory** and carry **equal** marks.

2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative :   **10**

    i) Variation in the items produced in a factory may be due to

      a) chance factors   b) assignable causes

      c) both (a) and (b)   d) none of the above

    ii) The value of Net Reproduction Rate (NRR) < 1 indicates

      a) increase in population   b) reduction in population

      c) population remains constant   d) all of these

    iii) Accepting H_0 when H_0 is false is

      a) Type I error   b) Type II error

      c) Type III error   d) None of these

    iv) Which of the following leads to two tailed test ?

      a) $H_1 : p = 0.5$ b) $H_1 : p \neq 0.5$

      c) $H_1 : p > 0.5$ d) $H_1 : p < 0.5$

    v) Control charts consist of

      a) three control lines   b) upper and lower control limits

      c) the level of the process   d) all the above

vi) Level of significance is the probability of

    a) Type I error   b) Type II error

    c) Both (a) and (b)   d) None of these

vii) The number of possible samples of size n out of N population units without replacement is

    a) N_{c_n} b) N^n

    c) n^2 d) n!

viii) Students t test is applicable for _____ samples.

    a) small   b) large

    c) any size   d) none of these

ix) To test for independence of attributes which of the following tests is used

    a) Normal   b) t

    c) χ^2 d) F

x) To test for the variance of normal population the test statistic used is

    a) Normal   b) χ^2

    c) t   d) F

2. Answer **any five** of the following :   **10**

  i) Define Gross Fertility Rate (GFR) and Total Fertility Rate (TFR).

  ii) Explain what is a null hypothesis. Give an example.

  iii) Explain what is a composite hypothesis. Give an example.

  iv) Explain 'sample' with illustration.

  v) Explain the term fraction defective.

  vi) Explain census survey with illustration.

3. A) Answer **any two** of the following : **6**

    i) Write the standard errors of the following :

      a) Sample mean

      b) Sample proportion

      c) Difference of two sample means

    ii) Explain the procedure of setting a control chart for fraction defective in a production process with fixed sample size.

    iii) Explain Type I and Type II errors.

  B) Prove the following : **4**

    For the 2 x 2 contingency table, prove that the chisquare test for independence gives

$$\chi^2 = \frac{N(ad - bc)^2}{(a + c)(a + b)(c + d)(b + d)}$$

4. Answer **any two** of the following : **10**

    i) Explain the construction of $\overline{X}$ chart when standards are given.

    ii) Explain the methods of sampling.

    iii) Explain the test procedure for testing the goodness of fit.

5. Answer **any one** of the following : **10**

    1) With usual notations, prove that $V(\overline{y}_n) = \left(\frac{N - n}{Nn}\right)S^2$.

    2) a) Distinguish between process control and product control.

      b) Explain the procedure to test for the significance of the difference between two population means based on two random samples from two independent normal populations.

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Seat No.	

B.Sc. (Part – II) (Old) (Semester – IV) Examination, 2016
ZOOLOGY (Paper – VIII)
Histology and Physiology

Day and Date : Friday, 29-4-2016   Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Draw **neat** and labelled diagrams **wherever** necessary.
3) Figures to the **right** indicate **full** marks.

1. Select the appropriate answer from those given below of each question and complete the sentence.   **10**

1) The epithelium present in cornea, oesophagus and vagina is _____ type.

    a) glandular   b) ciliated   c) columnar   d) muscular

2) The pancreas is _____ type of digestive gland.

    a) exocrine   b) endocrine   c) heterocrine   d) apocrine

3) _____ cells of liver secretes bile juice.

    a) Kupffer's   b) Hepatic   c) Leydig   d) Sertoli

4) The ovary performs the function of _____

    a) spermatogenesis   b) glycogenesis
    c) gluconeogenesis   d) oogenesis

5) ACTH is secreted by _____

    a) adrenal gland   b) thyroid gland
    c) thymus gland   d) pituitary gland

6) Test tube baby technique was firstly discovered by _____

    a) R. Edward & P. Steptoe   b) Sherrington
    c) Louis Pasteur   d) Jemes Watson

7) Structurally antibodies are _____ proteins.

    a) Z-shaped   b) Y-shaped   c) W-shaped   d) X-shaped

8) Oral contraceptives are commonly called as _____
   a) Pills   b) IUCD   c) IUD   d) Sterilization

9) The duration of estrous cycle in rat is _____ days.
   a) 5   b) 10   c) 15   d) 28

10) Colostrum is secreted by breast contains _____
    a) milk   b) milk with sugar
    c) milk with salt   d) milk without fat

2. Answer **any five** of the following :   **10**
   i) Graaffian follicle
   ii) V.S. of tooth
   iii) Amniocentesis
   iv) Malpighian body
   v) Functions of growth hormone
   vi) Role of Sertoli cells.

3. A) Answer **any two** of the following :   **6**
   i) Describe the ovulatory phase of menstrual cycle.
   ii) Describe the chemical contraceptive methods.
   iii) Describe the structure of nerve cell.

   B) Describe the male sex hormones.   **4**

4. Answer **any two** of the following :   **10**
   i) Describe the humoral immunity.
   ii) Describe the oestrous cycle in rat.
   iii) Describe the hormonal control of testicular activity.

5. Answer **any one** of the following :   **10**
   i) Describe the different hormones secreted by the adenohypophysis of pituitary gland.
   ii) Describe any two types of epithelial tissues with reference to their location, structure and functions.

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Seat
No.

B.Sc. II (Semester – IV) (Old) Examination, 2016
MATHEMATICS (Paper – VII)
Differential Equations

Day and Date : Saturday, 30-4-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Select the correct alternative for **each** of the following :   **10**

   1) The equation $P_0 \dfrac{d^2y}{dx^2} + P_1 \dfrac{dy}{dx} + P_2 = 0$, where p_0, p_1, p_2 are the functions of

   x, y and if it is solvable for p, then it takes the form _____
   a) $[p - f_1(x, y)] [p - f_2(x, y)] = 0$
   b) $[x - f_1(y, p)] [x - f_2(y, p)] = 0$
   c) $[y - f_1(x, p)] [y - f_2(x, p)] = 0$
   d) None of these

   2) To remove the first order derivative from the equation $\dfrac{d^2y}{dx^2} + P \dfrac{dy}{dx} + Qy = R$,

   where P, Q, R are functions of x or constants we take u = _____

   a) $e^{\frac{1}{2}\int Pdx}$ b) $e^{-\frac{1}{2}\int Pdx}$ c) $e^{\int Pdx}$ d) $e^{-\int Pdx}$

   3) The necessary condition for integrability of the total differential equation

   $\overline{A} \cdot d\overline{r} = Pdx + Qdy + Rdz = 0$ where $\overline{A} = P\overline{i} + Q\overline{j} + R\overline{k}$ and $\overline{r} = x\overline{i} + y\overline{j} + z\overline{k}$ is

   _____

   a) $\overline{A} \times \text{curl } \overline{A} = 0$ b) $\overline{A} \times \nabla \overline{A} = 0$

   c) $\overline{A} \cdot \text{curl } \overline{A} = 0$ d) $\overline{A} \cdot \nabla \overline{A} = 0$

P.T.O.

4) The condition of integrability is satisfied by the equation Pdx + Qdy + Rdz = 0, then this equation is known as _____ equation.
   a) Linear
   b) Cauchy -Euler
   c) Clairaut's
   d) Exact

5) If P_1, Q_1, R_1 is a set of multipliers for solving the equation $\dfrac{dx}{P} = \dfrac{dy}{Q} = \dfrac{dz}{R}$, then to get the solution we must have _____
   a) $PP_1 + QQ_1 + RR_1 = 0$
   b) $PP_1 + QQ_1 + RR_1 \neq 0$
   c) $P_1Q_1 + Q_1R_1 + R_1P_1 = 0$
   d) $P_1Q_1 + Q_1R_1 + R_1P_1 \neq 0$

6) $a_0(a + bx)^n \dfrac{d^n y}{dx^n} + a_1(a + bx)^{n-1} \dfrac{d^{n-1} y}{dx^{n-1}} + ... + a_n y = X$, where a_0, a_1, ..., a_n, a, b are constants and X is function of x only then it is called as _____ equation.
   a) Lagrange's linear
   b) Lengendre's linear
   c) Pfaffian differential
   d) None of these

7) $y = x^2$ is the part of the solution in C.F. of $\dfrac{d^2 y}{dx^2} + P\dfrac{dy}{dx} + Qy = R$ where P, Q, R are functions of x or constants if _____
   a) $1 + P + Q = 0$
   b) $1 - P + Q = 0$
   c) $2 + 2Px + Qx^2 = 0$
   d) $P + Qx = 0$

8) The differential equation of the form given by y = x F (p) + f (p) is known as _____ equation.
   a) Lagrange's
   b) Cauchy's
   c) Clairaut's
   d) None of these

9) To reduce homogeneous linear differential equation to the differential equation with the constant coefficients we use the substitution as _____
   a) x = log z
   b) z = logx
   c) $z = e^{\int Pdx}$
   d) None of these

10) The equation $y^2 = \left(\dfrac{py}{x}\right)x^2 + f\left(\dfrac{py}{x}\right)$ is reduced to Clairaut's form by the substitution _____
   a) $y^2 = v$
   b) $e^{ax} = u$, $e^{by} = v$
   c) $x^2 = u$, $y^2 = v$
   d) None of these

2. Attempt **any five** of the following : **10**

   1) Solve $x^2p^2 + xyp - \sigma y^2 = 0$

   2) Solve $y + px = x^4p^2$

   3) Solve $\dfrac{dx}{xy} = \dfrac{dy}{y^2} = \dfrac{dz}{zxy - 2x^2}$.

   4) Test for integrability

      $(yz + xyz)\,dx + (zx + xyz)\,dy + (xy + xyz)\,dz = 0$.

   5) Reduce to the Clairaut's form by the substitution

      $x = \dfrac{1}{u},\ y = \dfrac{1}{v}$ and solve $y^2\,(y - xp) = x^4p^2$.

   6) Reduce the differential equation

      $\left\{ (x+1)^4 D^3 + 2(x+1)^3 D^2 - (x+1)^2 D + (x+1) \right\} y = \dfrac{1}{x+1}$

      to homogeneous linear differential equation.

3. A) Attempt **any two** of the following : **6**

   1) Solve $y^2 \cdot \log y = xpy + p^2$

   2) Solve $\dfrac{dx}{y(x+y)+az} = \dfrac{dy}{x(x+y)-az} = \dfrac{dz}{x+y}$

   3) Solve $(e^x y + e^z)\,dx + (e^y z + e^x)\,dy + (e^y - e^x y - e^y z)\,dz = 0$.

   B) Solve $x^2 \dfrac{d^2y}{dx^2} + x \dfrac{dy}{dx} - y = 0$ given that $x + \dfrac{1}{x}$ is the known integral. **4**

4. Attempt **any two** of the following : **10**

   1) Explain how to solve linear differential equation of second order by the reduction of its order

   2) Solve $(x^2 D^2 - 3xD + 5)y = x^2 \cdot \sin(\log x)$

3) Transform the differential equation

$$\cos x \frac{d^2y}{dx^2} + \sin x \frac{dy}{dx} - 2y \cos^3 x = 2\cos^5 x$$

by changing to independent variable z = sinx and solve it.

5. Attempt **any one** of the following :   **10**

1) Reduce the differential equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$

Where P, Q, R are functions of x or constants to its normal form and then

solve $\frac{d^2y}{dx^2} - 4x\frac{dy}{dx} + (4x^2 - 1)y = -3e^{x^2}.\sin zx$.

2) State and prove necessary condition for integrability of the total differential equation Pdx + Qdy + Rdz = 0 where P, Q, R are functions of x, y, z and

then find f (z) for which $\frac{y^2 + z^2 - x^2}{2x}dx - ydy + f(z)dz = 0$ is integrable and

hence solve it.

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Seat
No.

B.Sc. (Part – II) (Semester – IV) Examination, 2016
BOTANY (Old)
Paper – VII : Plant Physiology and Cytogenetics

Day and Date : Saturday, 30-4-2016

Time : 2.30 p.m. to 4.30 p.m.   Max. Marks : 50

Instructions : 1) **All** questions carry **equal** marks.

2) Question **1** is **compulsory**.

3) Draw **neat** and labelled diagrams **wherever** necessary.

4) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences using correct answer :   **10**

1) _____ BGA is capable to nitrogen fixation.

   a) Spirogyra   b) Nostoc   c) Sargassum   d) Ectocrpus

2) The translocation of organic substances through transport tissue is called

   a) Phloem transport b) Xylem transport   c) Both (a) and (b) d) None of these

3) During night, stomata are open in

   a) C3 Plants   b) C4 Plants   c) C2 Plants   d) CAM Plant

4) _____ is an example of aerobic bacteria.

   a) Azotobacter   b) Aerobacter
   c) Clostridium   d) Nostoc

5) C4 cycle is known as

   a) HSK pathway   b) Calvin cycle
   c) CAM pathway   d) Darwin pathway

6) Turner syndrome is caused by _____ genotype.

   a) XO   b) XXY   c) XXX   d) XYY

7) Separation of linked gene is called

   a) Linkage   b) Crossingover
   c) Segregation   d) Genetic mutation

P.T.O.

8) Klinefelter's syndrome has _____ number of chromosome.

    a) 45   b) 46   c) 47   d) 44

9) Coupling and repulsion phenomenon was concerned with

    a) Crossing over   b) Mutation   c) Linkage   d) All of these

10) Trisomy and monosomy is represented by

    a) $2n - 1$ and $2n + 1$ b) $2n + 1$ and $2n - 1$

    c) $2n$ and $2n + 1$ d) $2n$ and $2n - 1$

2. Write **any five** of the following :   **10**

   1) Define dimorphic chloroplast.

   2) What is apoplast ?

   3) Define non symbiotic nitrogen fixation.

   4) What are CAM ?

   5) What is linkage ?

   6) What is deletion ?

3. A) Write **any two** of the following :   **6**

      1) Describe in brief Mass-flow hypothesis.

      2) Significance of meiosis.

      3) Explain break and exchange theory.

  B) What is coupling and repulsion theory.   **4**

4. Write **any two** of the following :   **10**

   1) Explain mechanism of crossing over.

   2) What is inversion explain with example.

   3) Explain the mechanism of CO2 fixation in CAM plants.

5. Write **any one** of the following :   **10**

   1) Cyclic photophosphorylation.

   2) Explain the mechanism of CO_2 fixation in C_4 plants and distinguish between C_3 and C_4 pathway.

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SLR-W – 111

Seat No.	

B.Sc. – II (Semester – IV) (Old) Examination, 2016
MATHEMATICS
Abstract Algebra (Paper – VIII)

Day and Date : Monday, 2-5-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions carry **equal** marks.
             2) **All** questions are **compulsory**.
             3) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative of **each** of the following :   **10**

    1) $(N, .)$ is not a group since it does not satisfy property _____
      a) Closed   b) Associative   c) Identify   d) Inverse

    2) Order of alternating group A_6 is _____
      a) 360   b) 720   c) 6   d) None of these

    3) A relation $\sim$ is symmetric if for p, q $\in$ s
      a) $p \sim q \Rightarrow p \sim p$ b) $p \sim q \Rightarrow q \sim p$ c) $p \sim q \Rightarrow q \sim q$ d) None of these

    4) If p|q and q|r then
      a) r|p   b) r|q   c) p|r   d) none of these

    5) Let $f : G \rightarrow G'$ be a mapping, then fishomomorphism if f _____
      a) isinto   b) isonto
      c) preserves operations   d) none of these

    6) A subgroup N of a group G is normal if for $n \in N$ and $g \in G$ such that
      a) $gnp^{-1} \in N$ b) $ngn^{-1} \in N$ c) $n^{-1}gn \in N$ d) none of these

    7) The value of the expression $[2] \odot [-7]$ in Z_5 is _____
      a) [0]   b) [1]   c) [2]   d) [3]

    8) A subgroup containing only the identity element of the group G is called
       _____
      a) trivial   b) nontrivial   c) proper   d) none of these

P.T.O.

9) The units in $Z_7^{\#}$ are _____

     a) {1, 2, 3, 4}   b) {1, 3, 5}   c) {1, 2, 3, 4, 5,6}   d) none of these

10) The order of the cyclic permutation (1 2 3) (3 5 7) is _____

     a) 1   b) 2   c) 3   d) 6

2. Attempt **any five** of the following :   **10**

1) If $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 1 & 4 & 5 & 6 & 2 \end{pmatrix}$ and $\beta = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 4 & 1 & 3 & 6 & 5 \end{pmatrix}$ and find $\alpha^2 \cdot \beta$.

2) Define equivalence relation.

3) Define group with respect to addition.

4) Prove that every cyclic group is abelian.

5) Find all subgroups of Z_{12}.

6) Compute ([4] $\odot$ [3]) + ([3] $\odot$ [4]) in Z_5.

3. A) Attempt **any two** of the following :   **6**

    1) Prove that if G is group then for any a, b $\in$ G $(ab)^{-1} = b^{-1}a^{-1}$.

    2) Let f : G $\rightarrow$ G′ be a homomorphism, then show that f(e) = e′ where e and e′ are identity element of G and G′.

    3) Solve the equation (12)x = (123) in S_3.

B) Does the following set form a group (I, ✩) where ✩ is defined as a ✩ b = a + b +1.   **4**

4. Attempt **any two** of the following :   **10**

    1) Find the gcd and write it as a linear combination of the two given integers (1001, 33).

    2) If a, b are any two elements of group G then show that the equations ax = b and ya = b have unique solution in (G, ·).

    3) Let G and G′ be two groups and f : G $\rightarrow$ G′ is a homomorphism then prove that Kerf is normal subgroup of G.

5. Attempt **any two** of the following :   **10**

    a) State and prove the fundamental theorem of group homomorphism.

    b) 1) Prove that a non empty subset H of group G is subgroup iff whenever

        a $\in$ H, b $\in$ H then product $ab^{-1} \in$ H.

      2) Prove that for every element a in a group $a^2 = e$ then G is abelian.

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Seat No.

B.Sc. – II (Semester – IV) (Old) Examination, 2016
BOTANY (Paper – VIII)
(Plant Diversity and Utilization)

Day and Date : Monday, 2-5-2016   Total Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N. B. : 1) **All** questions are **compulsory**.
2) **Draw** neat and labeled diagram **wherever** necessary.
3) Figures to **right** indicate **full** marks.

1. Rewrite the following sentences by choosing correct alternatives :   **10**

1) _____ is a fodder legume.
   a) Sugarcane   b) Bajara
   c) Sesbania   d) Jawar

2) Ground nut is source of _____ oil.
   a) Vegetable   b) Non-edible
   c) Lubricant   d) Non-vegetable

3) _____ of *Zingiber officinale* is used in medicine.
   a) Tubers   b) Bulbs
   c) Roots   d) Rhizomes

4) _____ is a plant of ornamental potential.
   a) Bougainvillea   b) Neem
   c) Adhathoda   d) Emblica officinale

5) Indigo is a source of natural
   a) Dyes   b) Medicine
   c) Pesticide   d) Insecticide

6) _____ is a promising species of botanical pesticides.
   a) Saffron   b) Henna
   c) Tobacco   d) Manjista

7) _____ is a host plant of Puccinia.
   a) Sugarcane   b) Jawar
   c) Maize   d) Barberry

P.T.O.

8) _____ type of pollination is present in <u>Pinus</u>.
   a) Insect
   b) Wind
   c) Animal
   d) Water

9) <u>Sargassum</u> is a _____ algae.
   a) Fresh water
   b) Marine water
   c) Back water
   d) Brackish Water

10) Resin canals are present in wood of
   a) <u>Sargassum</u>
   b) <u>Antheceros</u>
   c) <u>Equisetum</u>
   d) <u>Pinus</u>

2. Answer **any five** of the following :   **10**
   1) Structure of teleutospores of <u>Puccinia</u>.
   2) Draw neat labeled diagram of T. S. of main axis <u>Sargassum</u>.
   3) Write any four types of plant fibres.
   4) List two medicinal uses of *Embilica officinallis.*
   5) Write any two economic importance of Saffron.
   6) Write any two properties of natural rubber.

3. A) Answer **any two** of the following :   **6**
   1) Write in brief on Uridial stage of <u>Puccinia</u>.
   2) Explain structure of sporophyte of <u>Anthoceros</u>.
   3) Economic importance of Turmeric.

   B) Give an account of <u>Tinospora cordifolia</u> along with its chief constituents that used in medicines.   **4**

4. Answer **any two** of the following :   **10**
   I) Write in brief on structure of Strobilus of <u>Equisetum</u> with suitable diagram.
   II) Write Botanical name, morphology and economic importance of Red gram.
   III) Write Botanical name, morphology and economic importance of Cotton.

5. Answer **any one** of the following :   **10**
   I) Explain in brief the structure of megasporophyll of <u>Pinus</u> with suitable diagram.
   II) Give an account of alternation of generation of <u>Anthoceros</u> with suitable diagram.

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Seat No.

B.Sc. – II (Semester – IV) (Old) Examination, 2016
ELECTRONICS (Paper – VII)
Fundamentals of Operational Amplifier

Day and Date : Tuesday, 3-5-2016
Time : 10.30 a.m. to 12.30 p.m.

Max. Marks : 50

N. B.** :* 1) ***All *questions are **compulsory**.*
2) ***Draw*** *neat diagrams **wherever** necessary.*
3) *Figures to the **right** indicate **full** marks.*
4) ***Use*** *of log-table and calculator is **allowed**.*

1. Select the correct alternative from the following : **10**

   i) The input stage of every op-amp is a
      a) differential amplifier
      b) push-pull amplifier
      c) common-base amplifier
      d) none of these

   ii) Current mirror circuit is used to
      a) increase CMRR
      b) increase output
      c) decrease CMRR
      d) none of these

   iii) The output stage of a IC741 op-amp is a
      a) differential amplifier
      b) common base amplifier
      c) common emitter amplifier
      d) push-pull amplifier

   iv) The op-amp can amplify
      a) a.c. signals only
      b) d.c. signals only
      c) both a.c. and d.c. signals
      d) none of these

v) In an inverting amplifier the input and output voltages are

   a) in phase
   b) 90° out of phase
   c) 180° out of phase
   d) 360° out of phase

vi) V to I amplifier is called as

   a) transconductance amplifier
   b) log amplifier
   c) transresistance amplifier
   d) none of these

vii) A comparator never uses

   a) positive feedback
   b) an input signal
   c) negative feedback
   d) none of these

viii) Zero crossing detector is a comparator having

   a) $V_{ref} = V_{cc}$
   b) $V_{ref} = -V_{cc}$
   c) $V_{ref} = 0$
   d) none of these

ix) The closed loop gain in a wien bridge oscillator is

   a) 13
   b) 29
   c) greater than 29
   d) 3

x) The phase shift oscillator usually has

   a) two lead or lag circuits
   b) a lead-lag circuit
   c) three lead or lag circuits
   d) none of these

2. Answer **any five** of the following : **10**

   i) Why differential amplifier is necessary ?

   ii) Give any four specifications of IC741.

   iii) In case of op-amp. If CMRR = 4000 and A_c = 0.3, then find A_d.

   iv) Explain the concept of virtual ground.

   v) Draw the circuit diagram of sawtooth oscillator with the help of op-amp.

   vi) Draw the circuit diagram of integrator using op-amp.

3. A) Answer **any two** of the following : **6**

   i) What is voltage follower ? Explain it in detail. What is its use ?

   ii) How op-amp can be used as comparator ?

   iii) Compare open loop and close loop configuration of op-amp.

  B) In an inverting adder $V_1 = 0.1$ V, $V_2 = 0.2$ V, $V_3 = 0.6$ V, $R_1 = 1$ kΩ, $R_2 = 2$ kΩ, $R_3 = 3$ kΩ. Find V_0, if $R_f = 10$ kΩ. Also draw a neat circuit diagram with given values. **4**

4. Answer **any two** of the following : **10**

  i) Draw the neat circuit of half wave precision rectifier and explain its working.

  ii) Explain op-amp as phase shift oscillator.

  iii) With neat circuit diagram explain constant current bias circuit.

5. Answer **any one** of the following : **10**

  i) Explain the use of op-amp as astable multivibrator. Obtain an expression for its frequency.

  ii) What is differential amplifier ? What are the different configurations of differential amplifier ? Explain emitter coupled differential amplifier.

_____

B.Sc. – II (Semester – IV) (Old) Examination, 2016
GEOLOGY (Paper – VII)
Igneous Petrology

Day and Date : Tuesday, 3-5-2016　　　　　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Draw **neat** diagrams **wherever** necessary.
　　　　　　　　3) Figures to the **right** indicate **full** marks.

1. Fill in the blanks with suitable answer from the given options :　　　　**10**

　1) As per the Bowen's reaction series, the last mineral to form is
　　　a) Quartz　　　　b) Olivine　　　　c) Mica　　　　d) Plagioclase

　2) Granite rock is a _____ rock.
　　　a) Basic　　　　b) Acidic　　　　c) Intermediate　　d) Ultrabasic

　3) _____ is the essential mineral in acid rocks.
　　　a) Muscovite　　b) Biotite　　　　c) Augite　　　　d) Quartz

　4) Texture of Igneous rocks means the _____ of mineral grains in rock.
　　　a) size　　　　　b) shape　　　　c) arrangement　d) all of these

　5) Unicomponent rocks are _____
　　　a) Abundant　　　　　　　　　b) Moderate
　　　c) Extremely rare　　　　　　d) None of these

　6) Minerals which are present in small amount and whose presence or absence
　　is disregarded in defining the rock type, are called _____ minerals.
　　　a) accessory　　b) essential　　c) secondary　　d) tertiary

　7) The femic minerals are _____
　　　a) Diopside　　b) Hypersthene　c) Olivine　　　d) All of these

P.T.O.

8) In crystallisation of _____ magma, the freezing points are lowered.
   a) Unicomponent   b) Binary   c) Tertiary   d) Multi component

9) Plagioclase felspar and mafic minerals are present in almost equal amount in _____
   a) Granite   b) Gabbro   c) Dunite   d) Pitchstone

10) The continuous and discontinuous reaction series studied by _____
   a) Kant   b) N.L. Bowen   c) Lapalace   d) Wichert

2. Answer **any five** of the following.   **10**

   1) Define "Eutectic Point".

   2) Meaning of essential minerals in Igneous rocks.

   3) What is differentiation process in magma ?

   4) What is holocrystalline Texture ?

   5) What is Labile region ?

   6) Name any four salic minerals.

3. A) Answer **any two** of the following.   **6**
   1) Ophitic texture
   2) Poikilitic texture
   3) Xenolith formation.

   B) Bowen's reaction series.   **4**

4. Answer **any two** of the following.   **10**
   1) Explain formation of glass and crystals.
   2) Tabular classification of Igneous rocks.
   3) Describe crystallisation process of Binary magma.

5. Answer **any two** of the following.   **10**
   1) Describe Assimilation process in magma.
   2) Explain differentiation process by liquid Immescibility.
   3) Describe Intergrowth texture.

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Seat
No.

B.Sc. II (Semester – IV) (Old) Examination, 2016
MICROBIOLOGY (Paper – VII)
Immunology & Medical Microbiology

Day and Date : Tuesday, 3-5-2016　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory.**
　　　　　　　　2) Figures to the **right** indicate **full** marks.
　　　　　　　　3) Draw diagram **wherever** necessary.

1. Rewrite the following sentences by choosing the correct answers.　　**10**

　　i)　Incomplete antigen is known as _____

　　　　a) aggresin　　　　　　　　　　b) antibody

　　　　c) hapten　　　　　　　　　　　d) forssman antigen

　　ii)　_____ immunoglobulin crosses the placenta.

　　　　a) Ig M　　　　b) Ig G　　　　c) Ig D　　　　d) Ig E

　　iii)　Coagulase enzyme is produced by _____

　　　　a) *Candida albicans*

　　　　b) *Salmonella typhi*

　　　　c) *Staphylococcus aureus*

　　　　d) *Proteus vulgaris*

　　iv)　_____ is not primary lymphoid organ.

　　　　a) Thymus　　　　　　　　　　b) Bone marrow

　　　　c) Bursa of Fabricious　　　　d) Spleen

　　v)　Widal test is example of _____

　　　　a) complement fixation test　　b) agglutination test

　　　　c) precipitation test　　　　　d) flocculation test

vi) Exotoxins are _____ chemical.

   a) proteins   b) lipoproteins

   c) lipopolysaccharides   d) glycoproteins

vii) Blood group antigen is an example of _____

   a) autoantigen   b) isoantigen

   c) organ specific antigen   d) heterophile antigen

viii) Dengue fever is _____

   a) bacterial disease   b) viral disease

   c) fungal disease   d) protozoal disease

ix) _____ putforth clonal selection hypothesis of antibody formation.

   a) Burnett   b) Jenner   c) Widal   d) Louis Pasteur

x) Hyaluronidases are enzymes which attack _____

   a) collagen   b) hyaluronic acid

   c) phagocytic cells   d) DNA

2. Answer **any five** of the following.   **10**

  i) Define Vaccine.

  ii) Give any two differences between Ig G and Ig M.

  iii) Write any two prophylactic measures for enteric fever.

  iv) Define heterophile antigen. Give one example.

  v) List different microscopic methods used in clinical microbiology.

  vi) Write symptoms of dengue fever.

3. A) Attempt **any two** of the following.   **6**

    i) Cultural characteristic of *staphylococcus aureus*.

    ii) Transportation of clinical specimen.

    iii) Role of inflammation in immunity.

  B) Describe in detail about primary and secondary immune response.   **4**

4. Write short notes on **any 2.** **10**

    i)   Mechanical barriers of innate immunity.

    ii) Complement fixation test.

    iii) Methods of specimen collection.

5. Write notes on **any 2.** **10**

    i)   Urinary tract infection.

    ii) Widal test.

    iii) Types of T lymphocytes and their role.

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Seat No.

B.Sc. II (Semester – IV) (Old) Examination, 2016
ELECTRONICS (Paper – VIII)
Digital Techniques and Microprocessor

Day and Date : Friday, 6-5-2016   Total Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Draw neat labelled diagram **wherever** necessary.
3) Figures to the **right** indicate **full** marks.
4) Use of log table and calculator is **allowed**.

1. Select the correct alternative for the following :   **10**

   i) IC 2764 is _____ K byte memory chip.

   a) 1   b) 2   c) 4   d) 8

   ii) R-2R ladder network is used for

   a) DAC   b) ADC   c) PAL   d) None of these

   iii) _____ IC is used as DAC.

   a) 8808   b) 8080   c) 0808   d) 8085

   iv) In tri-state logic the 3rd state is

   a) High output   b) Low output   c) High impedance   d) Low impedance

   v) _____ IC is used as address latch.

   a) 74244   b) 74245   c) 74373   d) 8085

   vi) _____ bus is bidirectional.

   a) Address   b) Data   c) Control   d) None of these

   vii) _____ instruction is one byte instruction.

   a) MOV A, B   b) MVI A 8 bit   c) ADD B   d) Both a and c

   viii) ALE is _____ line.

   a) Address Latch Enable   b) Address Logic Enable

   c) Arithmetic Latch Enable   d) Arithmetic Logic Enable

P.T.O.

ix) To make accumulator zero which instruction is used ?

   a) ADD A   b) XRA A   c) MOV A, A   d) ANA A

x) _____ IC is line transreceiver.

   a) 74244   b) 74245   c) 74138   d) 74373

2. Answer **any five** (**two** marks **each**) :   **10**

  i) What is memory ? Write types of memories.

  ii) State any four features of ADC 0804.

  iii) Name any four data transfer instructions.

  iv) Name the Interrupts used in 8085.

  v) Explain function of IO/$\overline{M}$ control signal.

  vi) Classify the following instructions in 1 byte and 2 byte format.

    a) ADD B   b) MOV B, A   c) MVI C 8 bit   d) ADI 8 bit

3. A) Answer **any two** from the following (**three** marks **each**) :   **6**

   i) Explain the instruction LXI Rp.

   ii) Give the classification of Instruction set with example.

   iii) Draw the reset circuit used in 8085.

  B) Write Assembly Language Program for Addition of two 8 bit numbers stored in memory locations 6100H, 6101H and store the result in memory location 6102H.   **4**

4. Answer **any two** of the following (**five** marks **each**) :   **10**

  i) Write the salient features of 8085.

  ii) Explain IC 2764 with block diagram.

  iii) Write note on CPLD.

5. Answer **any one** :   **10**

  i) Explain the architecture of 8085 using block diagram.

  ii) Discuss different arithmetic instructions for microprocessor 8085. Write a program to multiply two 8 bit numbers.

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SLR-W – 121

B.Sc. – II (Semester – IV) (Old) Examination, 2016
GEOLOGY
Sedimentary and Metamorphic Petrology (Paper – VIII)

Day and Date : Friday, 6-5-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
                2) Figures to the **right** indicate **full** marks.
                3) **Draw** neat labelled diagrams **wherever** necessary.

1. Fill in the blanks with correct answer from given options :   **10**

    1) The most heterogenous rock is _____

       a) Conglomerate   b) Breccia   c) Arkose   d) Grit

    2) Deposition of deltas occur in _____ environment.

       a) Transitional   b) Lacustrine   c) Terrestrial   d) Marine

    3) The grain size of arenaceous rocks is between _____ and _____ mm.

       a) 4.0 – 3.5   b) 3.5 – 2.5   c) 2.5 – 2.0   d) 2.0 – 0.1

    4) Black shales indicate _____ environment of deposition.

       a) Oxygen rich   b) Reducing   c) Desert   d) Glacial

    5) Conglomerate and Breccia are distinguished on the basis of their _____

       a) Chemical composition   b) Cementing material

       c) Mineral composition   d) Shape of fragments

    6) Slate and phyllite are formed by _____

       a) Low temperature and low pressure

       b) Only high temperature

       c) High temperature and high pressure

       d) Only pressure

    7) In contact metamorphism, metamorphic effects are greatest adjacent to _____ rocks.

       a) Sedimentary   b) Metamorphic   c) Extrusive   d) Intrusive

8) Polymetamorphism can be recognized _____
   a) Strain-slip cleavage
   b) Cleavage
   c) Schistosity
   d) Rock Cleavage

9) Partial replacement of garnet by irregular rims of chlorite indicates _____
   a) Migmatisation
   b) Retrograde metamorphism
   c) Anataxis
   d) Granitisation

10) Pyrope garnet and omphacite minerals are characteristic of _____ metamorphic facies.
   a) Greenschist   b) Amphibolite   c) Eclogite   d) Granulite

2. Answer **any five** of the following :   **10**

   i) What is Arkose ?

   ii) What is Roundness of grains ?

   iii) What is composition of bauxite ?

   iv) Minerals and rocks of amphibolite facies.

   v) Which type of metamorphism produces Marble ?

   vi) Characters of migmatites.

3. A) Answer **any two** of the following :   **6**

   i) What are the chemical and environmental conditions for the formation of laterites ?

   ii) Explain any three processes of diagenesis.

   iii) How scarns are formed ?

   B) Explain shales with respect to texture, structure and mineral characters.   **4**

4. Answer **any two** of the following :   **10**
   i) Describe anatexis.
   ii) Describe in brief classification of sedimentary rocks based on size of grains.
   iii) Describe conglomerates and explain their environment of deposition.

5. Answer **any two** of the following :   **10**
   i) Describe granulite metamorphic facies.
   ii) Polymetamorphism
   iii) Pneumatolysis.

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Seat No.

B.Sc. – II (Semester – IV) Examination, 2016
MICROBIOLOGY (Old)
Paper – VIII : Applied Microbiology – II

Day and Date : Friday, 6-5-2016

Time : 2.30 p.m. to 4.30 p.m.   Max. Marks : 50

Instructions : 1) ***All*** questions are ***compulsory***.

            2) *Figures to the **right** indicates **full** marks.*

            3) *Draw **well** labelled diagram **wherever** necessary.*

1. Rewrite the sentences by selecting correct answer from given alternatives : **10**

   i) Pilot plant fermentor has _____ liters capacity.

      a) 100 – 500   b) 1 – 2   c) 50 – 100   d) 10,000 – 50,000

   ii) Fermentation media contains _____ % of water.

      a) 10   b) 70 – 90   c) 5   d) 40

   iii) _____ technique is used in screening for antibiotic producing organisms.

      a) Crowded plate   b) Seed plate   c) Petri plate   d) Pour plate

   iv) _____ fermentation process is always done in _____ fermentor before starting large scale operations of any fermentation.

      a) Small scale   b) Scale-in

      c) Scale-down   d) All of three above

   v) _____ is used in diffusion assay.

      a) Liquid medium   b) Paper disc   c) Acid   d) Alkali

   vi) _____ are used for aeration in the fermentor.

      a) Sparger   b) Baffles   c) Steam   d) Impeller

   vii) pH indicators are used in _____ screening for acid producing organisms.

      a) Primary   b) Secondary   c) Tertiary   d) Total

   viii) _____ method is used for recovery and purification of penicillin.

      a) Solvent extraction   b) Distillation

      c) Precipitation   d) Coagulation

ix) The measure of central tendency that divides the data in two equal parts is termed as

    a) Mean   b) Median   c) Mode   d) Variance

x) Over heating of fermentor during fermentation is controlled by

    a) Cooling jacket   b) Steam   c) Ice   d) Cooling air

2. Solve **any five** of the following :   **10**

  i) Define fermentation.

  ii) Aeration.

  iii) Opt. temperature and pH for alcohol fermentation.

  iv) Define dual fermentation.

  v) Role of impeller in fermentation.

  vi) Define mean.

  vii) What is primary screening ?

3. A) Answer **any two** of the following :   **6**

    i) Surface culture method.
    ii) Probiotics.
    iii) Batch fermentation.

  B) Describe in detail primary screening.   **4**

4. Answer the following (**any 2**) :   **10**

  i) Synchronous growth.

  ii) Design of fermentor.

  iii) Preservation of industrially important microbes.

5. Solve the following questions (**any two**) :   **10**

  i) Alcohol fermentation.

  ii) Diauxie growth.

  iii) Continuous fermentation.

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Seat
No.

B.Sc. (Part – II) (Semester – IV) Examination, 2016
CHEMISTRY (Paper – V)
Physical Chemistry (CGPA) (New)

Day and Date : Saturday, 23-4-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions : 1) **All** questions are **compulsory**.

2) Draw **neat** diagram and give equations **wherever** necessary.

3) Figures to the **right** indicate **full** marks.

1. Choose the most correct alternative of the following and rewrite the sentences :   **14**

   1) The SI unit of equivalent conductance is
      a) $S\ m^2\ eq$
      b) $S\ m^2\ eq^{-1}$
      c) $S\ m^{-2}\ eq$
      d) $S\ m^{-1}\ eq^{-1}$

   2) Each Cl^- ion in NaCl lattice, is surrounded by _____ Na^+ ions.
      a) 1
      b) 2
      c) 4
      d) 6

   3) Which of the following solution of the salt will have the highest value of equivalent conductance ?
      a) 0.001 M
      b) 0.01 M
      c) 0.1 M
      d) 1.0 M

   4) In an isobaric process of an ideal gas
      a) q = 0
      b) P = 0
      c) V = 0
      d) w = 0

   5) Body centered cubic lattice consists of _____ points at corners.
      a) 2
      b) 4
      c) 6
      d) 8

   6) When a ray of light passes from a less dense medium to a more dense medium, it is refracted
      a) towards normal
      b) away from normal
      c) at the normal
      d) all of these

P.T.O.

7) Bragg's diffraction law is
   a) $n\lambda = d \sin2\theta$
   b) $n\lambda = d \sin\theta$
   c) $n\lambda /2 = 2d \sin\theta$
   d) $n\lambda = 2d \sin\theta$

8) Which of the following is a bad conductor of electric current ?
   a) molten salts
   b) strong acids
   c) aqueous salts
   d) mica

9) The unit of entropy is
   a) JK^{-1}
   b) JK mol
   c) $JK^{-1} mol^{-1}$
   d) J

10) Which of the following substance possesses zero dipole moment ?
    a) ammonia
    b) water
    c) benzene
    d) o-nitrobenzene

11) The total entropy change for an irreversible cycle in an isolated system is
    _____ zero.
    a) less than
    b) greater than
    c) equal to
    d) none of these

12) The entropy of perfect crystalline substance at absolute zero Kelvin is
    a) infinite
    b) zero
    c) non-zero
    d) all of these

13) CO_2 and CS_2 have zero dipole moments. Hence, their structures should be
    a) angular
    b) non-linear
    c) linear
    d) none of these

14) The sum of the transport numbers of anion and cation is
    a) 0
    b) 1
    c) ∞
    d) –1

2. Solve **any seven** of the following : **14**
   1) Define the term specific conductance. Mention its unit.
   2) State Snell's law.
   3) What do you mean by degree of hydration ?
   4) Give the relationship between entropy and probability.
   5) State the law of constancy of interfacial angle.
   6) What is transport number ?
   7) What is polar and non-polar molecules ?
   8) State third law of thermodynamics.
   9) Define Weiss indices.

3. A) Attempt **any two** of the following : **10**

    1) Explain the factors affecting transport numbers.

    2) Derive the expression for entropy change for an ideal gas as a function of P and T.

    3) Discuss electrical polarization of molecules.

  B) Solve : **4**

    The equivalent conductance at infinite dilution of KNO_3 is 126 ohm^{-1}cm^2. The transport number of NO_3^- ion is 0.476. Calculate the ionic conductance and absolute mobility of K^+ and NO_3^- ions.

4. Attempt **any two** of the following : **14**

    1) Discuss the moving boundary method used for measurement of transport number of ions.

    2) Derive an expression for entropy change involved in mixing of gases.

    3) Discuss the structure of NaCl.

5. Attempt **any two** of the following : **14**

    1) Explain in detail Abbe's refractometer.

    2) With the help of Hittorf's rule, explain migration of ions.

    3) Discuss variation of specific and equivalent conductance with concentration.

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Seat No.

B.Sc. II (Semester – IV) (New CGPA) Examination, 2016
COMPUTER SCIENCE
Paper – V : (Data Structures)

Day and Date : Saturday, 23-4-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) ***All*** questions are ***compulsory***.
2) *Figures to the* ***right*** *indicate* ***full*** *marks.*

1. Choose correct alternative.   **14**

    1) _____ sorting method uses divide and conquer strategy.
        a) Merge   b) Quick   c) Bubble   d) Both a & b

    2) front = = rear state that, queue is _____
        a) Saturated   b) Overflow   c) Full   d) Empty

    3) _____ searching method must require sorted data.
        a) Binary   b) Linear
        c) Indexed sequential   d) Both b & c

    4) The node of _____ linked list has NULL pointer.
        a) Singly Circular   b) Doubly Circular
        c) Both a & b   d) None of these

    5) Root node in a tree has _____ number of ancestors.
        a) Zero   b) One
        c) Maximum two   d) Maximum one

    6) Bubble sort requires _____ maximum comparisons to sort 'N' elements.
        a) $N*(N + 1)/2$ b) $N*(N – 1)/2$
        c) $N + (N*1)/2$ d) $N – (N*1)/2$

    7) In time sharing operating system, _____ type of queue is used.
        a) Linear   b) Circular   c) Priority   d) Deque

8) _____ traversal of tree produces sorted data.

   a) Preorder   b) Inorder   c) Postorder   d) DFS

9) _____ is postfix form of prefix expression : −Z* + NM − BA.

   a) ZMN − + BA −*   b) MNZ + − BA −*

   c) ZNM + − BA −*   d) MNZ* − BA − +

10) _____ is non-linear data structure.

   a) Stack   b) Queue

   c) Linked list   d) None of these

11) Stack overflow condition occurs while performing _____ operation.

   a) create   b) isempty   c) isfull   d) push

12) In AVL tree, node _____ process is fast.

   a) Insertion   b) Deletion   c) Retrieval   d) Both a & b

13) All strictly binary trees are complete binary trees.

   a) True   b) False

14) Data structure is programming language.

   a) True   b) False

2. Answer **any seven** of the followings.   **14**

1) Convert following postfix expression into prefix form :
   ABC − + PQ +*.

2) What is advantage of singly linked list over doubly linked list ?

3) What is drawback of sequential access ?

4) Why queue is called FIFO data structure ?

5) Give the difference between Array and linked list.

6) Write condition to check circular queue is Full or not.

7) List out some applications of Binary tree.

8) What is internal and external sort ?

9) Why binary search is fast as compared to linear search ?

3. A) Attempt **any two** of the followings : **10**

   1) Explain Priority queue with its types.

   2) Write a program to count total number of vowels present in string using stack.

   3) What is ADT ? Explain ADT for character array.

   B) Write a program to implement bubble sort method. **4**

4. Answer **any two** of the followings : **14**

   1) Write a program to implement binary search tree with tree traversal methods.

   2) Write a program to check entered expression is valid or not using stack.

   3) How circular queue overcomes the drawback of linear queue ? Also, implement insert( ) and remove( ) operation of circular queue.

5. Answer **any two** of the followings : **14**

   1) Write an algorithm and also implement function that checks entered node is present in binary search tree or not.

   2) Explain following operations of doubly circular linked list :
      a) insert_last( )　　b) remove_after( ).

   3) Write a program to implement insertion sort method.

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Seat No.

B.Sc. – II (Semester – IV) (New CGPA) Examination, 2016
CHEMISTRY
Analytical And Industrial Inorganic Chemistry (Paper – VI)

Day and Date : Monday, 25-4-2016   Max. Marks : 70
Time :10.30 a.m. to 1.00 p.m.

Instructions : 1) **All** questions are **compulsory.**
2) **Draw** neat labeled diagram **wherever** necessary.
3) Figures to the **right** indicate **full** marks.

1. Select the most correct alternative and rewrite the following sentences.   **14**

    1) Colour change interval or pH range of phenolphthalein is _____
        a) 8.3 to 10   b) 8.3 to 12
        c) 4.2 to 6.3   d) 3.1 to 4.4

    2) Solochrome black is _____ indicator.
        a) Acid-base   b) Metallochromic
        c) Redox   d) Auto

    3) Theory of acid base indicator is put forward by _____
        a) Werner   b) Kekule
        c) W. Ostwald   d) Meyer

    4) Barium sulphate is mostly _____ precipitate.
        a) Gelatinous   b) Curdy
        c) Amorphous   d) Crystalline

    5) Nucleation is the _____ step of precipitation.
        a) Initial   b) Second
        c) Third   d) Final

6) DMG is a specific reagent for _____
   a) Cobalt
   b) Nickel
   c) Copper
   d) Zinc

7) Oxidation of oxalic acid by acidified $KMnO_4$ is an example of _____ catalysis.
   a) Acid-base
   b) Negative
   c) Auto
   d) Induced

8) Negative catalyst act as _____
   a) Poison
   b) Promoter
   c) Indicator
   d) Retarder

9) The parameters determining the water quality include _____
   a) Physical
   b) Chemical
   c) Biological
   d) All of these

10) The water that gives good lather on treatment with soap is called _____
    a) Hard water
    b) Soft water
    c) Permanent hard water
    d) Temporary hard water

11) The principal reaction in manufacture of sulphuric acid is _____
    a) $S \rightarrow SO_2$
    b) $SO_2 \rightarrow SO_3$
    c) $SO_3 \rightarrow H_2SO_4$
    d) $SO_3 \rightarrow H_2S_2O_7$

12) Oleum is nothing but _____
    a) 98% H_2SO_4
    b) conc.H_2SO_4
    c) Pyrosulphuric acid
    d) None of these

13) Steel is the _____ of iron with carbon content intermediate between cast iron and wrought iron.
    a) Either mixer or alloy
    b) Mixer
    c) Alloy
    d) None of these

14) In the annealing process, steel is heated to redness and cooled _____
    a) Naturally
    b) Suddenly
    c) At fixed temperature
    d) Slowly

2. Solve **any seven** of the following : **14**

1) What are the types of acid base titration ?

2) Define metallochromic indicator with suitable examples.

3) Give conditions for precipitation.

4) Define the terms :
   a) Nucleation
   b) Digestion.

5) Explain induced catalysis with suitable example.

6) Give any four characteristics of catalytic reactions.

7) Mention the parameters of potability of water.

8) In contact process, oxidation of SO_2 to SO_3 is effected at low pressure. Why ?

9) Define the terms :
   a) Hardening
   b) Case hardening.

3. A) Attempt **any two** of the following : **10**

1) Define catalysis. Explain homogenous and heterogenous catalysis with suitable examples.

2) Discuss the manufacture of ammonia by Haber's process.

3) What is steel ? Explain in brief types of steel.

B) Draw a neat labelled diagram of L. D. converter. Mention advantages of L.D. process. **4**

4. Answer **any two** of the following : **14**

   1) Explain the phenomenon of co-precipitation.

   2) Discuss the physicochemical principles involved in the manufacture of sulphuric acid by contact process.

   3) Explain Ostwald's colour change interval theory.

5. Answer **any two** of the following : **14**

   1) With the help of titration curve explain the choice of an indicator in titration between strong acid and strong base.

   2) What are organic precipitants ? Discuss role of organic precipitants in gravimetric analysis.

   3) Explain ion exchange method for treatment of industrial water.

_____

1. Choose correct alternatives : **14**

   1) In which step of SDLC project termination could be done ?

      a) Design Phase　　　　　　　　b) System Maintenance Phase

      c) Feasibility Study Phase　　　　d) Coding Phase

   2) _____ shows the flow of data, the process and the areas where they are stored.

      a) ER-diagram　　　　　　　　　b) HIPO chart

      c) DFD　　　　　　　　　　　　　d) None of these

   3) 2NF cannot be achieved unless data is in the 1NF.

      a) True　　　　　　　　　　　　　b) False

   4) History files, transaction reports are updated by_____

      a) TPS　　　　b) MIS　　　　c) DSS　　　　d) EIS

   5) Black box testing finds_____

      a) Interface errors　　　　　　　b) Syntax errors

      c) Coding errors　　　　　　　　d) Design errors

   6) System analyst should not create models / prototypes of the system.

      a) True　　　　　　　　　　　　　b) False

P.T.O.

7) Salary of the programmer is_____feasibility.

   a) Technical   b) Economical

   c) Operational   d) None of these

8) The 'Big picture' diagram of a system is the _____

   a) Logic diagram   b) Block diagram

   c) System flowchart   d) Program flowchart

9) _____ technique is used to collect information from individual or from groups.

   a) Observation   b) Questionnaire

   c) Interview   d) Record review

10) Decision table is a combination of _____

   a) Stubs and conditions   b) Input and output

   c) Conditions and actions   d) None

11) _____is not the element of the system.

   a) Input   b) Interface   c) Processors   d) Material

12) The old system is replaced by the new system is called _____

   a) Fact finding   b) Pilot

   c) Direct conversion   d) Cutoff

13) _____ symbol is used for online storage.

   a)   b)   c)   d)

14) Only expert persons able to do black box testing.

   a) True   b) False

2. Answer **any seven** of the followings :   **14**

   1) What is the purpose of DFD ?

   2) What is main objective of system analyst ?

   3) What is system maintenance ?

4) What is Flowchart ?

5) Define black box testing.

6) Write the difference between negative and positive feedback.

7) Define the term entity and attribute.

8) What is file ?

9) Define the term system and subsystem.

3. A) Attempt **any two** of the followings : **10**

1) What is normalization ? Explain 3NF with example.

2) Explain the different types of output.

3) Explain the different elements of the system.

B) Distinguish between system analysis and system design. **4**

4. Answer **any two** of the followings : **14**

1) What is testing ? Explain the need of testing in detail.

2) What is decision table ? Explain its types with example.

3) Draw an ER-diagram for college admission system.

5. Answer **any two** of the followings : **14**

1) Explain different fact finding techniques in detail.

2) Draw a CLD and first level DFD for library system.

3) Explain various activities involved in system design.

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Seat
No.

B.Sc. – II (Sem. – IV) (New) (CGPA) Examination, 2016
PHYSICS
Optics (Paper – V)

Day and Date : Tuesday, 26-4-2016   Max. Marks : 70

Time : 10.30 a.m. to 1.00 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) **Use** of log table or calculator is **allowed**.
4) **Neat** diagrams must be drawn **whenever** necessary.

1. Choose and write a correct answer from given **four** alternatives :   **14**

    i) Lagrange's law for magnification is given by
       a) $n_1 y_1 \tan \theta_1 = n_2 y_2 \tan \theta_2$
       b) $n_1 y_1 \sin \theta_1 = n_2 y_2 \sin \theta_2$
       c) $n_1 y_1 \tan \theta_1 = n_2 y_2 \sin \theta_2$
       d) $n_1 y_1 \cos \theta_1 = n_2 y_2 \cos \theta_2$

   ii) For an optical fibre to have greater information carrying capacity, the pulse dispersion must be
       a) Very small
       b) Very large
       c) Moderately large
       d) Zero

  iii) In Michelson's interferometer, interference is obtained by division of
       a) Wave front   b) Amplitude   c) Wavelength   d) Phase

   iv) For positive crystal, except along the optic axis
       a) Ve > Vo   b) Ve < Vo   c) Ve = Vo = 0   d) Ve = Vo = 1

    v) The radius of Fresnel's half period zone is directly proportional to the
       a) Natural number
       b) Square root of natural number
       c) Odd number
       d) Square root of odd number

   vi) The polarimeter used for measuring specific rotation of sugar solution is called
       a) Phase retarded plates
       b) Nicol Prism
       c) Analyzer
       d) Saccharimeter

P.T.O.

vii) The distance of an object and its image from the corresponding focal points are 9 cm and 4 cm respectively for a thick lens in air. Its focal length is

    a) 6 cm   b) 8 cm

    c) 4 cm   d) 2 cm

viii) The basic principal of optical fibres is

    a) Refraction   b) Reflection

    c) Total internal reflection   d) Polarization

ix) By Rayleigh's criterion, two spectral lines are said to be just resolved if the intensity at the dip is _____ times the intensity of either of the maxima.

    a) $\dfrac{\pi^2}{8}$ b) $\dfrac{8}{\pi^2}$ c) $\dfrac{4}{\pi^2}$ d) $\dfrac{\pi^2}{4}$

x) In case of diffraction of light at straight edge.

    a) The band width increases away from the edge of the shadow

    b) The band width remains same

    c) The band width decreases away from the edge of the shadow

    d) None of the above

xi) In Quarter wave plate, phase difference between E ray and O ray is

    a) $\pi/4$ b) $\pi/2$

    c) π d) 2π

xii) The intensity of the fringes in F.P. Interferometer is _____ than in Michelson's interferometer.

    a) Equal   b) Much smaller

    c) Much more   d) More

xiii) Principal planes are the cardinal planes of

    a) Unit positive angular magnification

    b) Unit positive lateral magnification

    c) Unit positive longitudinal magnification

    d) Unit negative angular magnification

xiv) The area of all half period zones are _____ for given values of b and λ.

    a) Different

    b) Equal

    c) Increases as order increases

    d) None of the above

2. Solve **any seven** of the following : **14**

   i) State any two advantages of optical fibre.

   ii) Define nodal points for a lens system.

   iii) State the laws of rotation of plane of polarization.

   iv) How zone plate is constructed ?

   v) Draw a neat labelled diagram for Graphical construction of image by using the properties of cardinal planes and points.

   vi) A 10% sugar solution taken in a polarimeter tube of length 20 cm rotates the plane of polarization of the light of wavelength 6000 A° through 12°. Calculate the specific rotation of sugar.

   vii) When a thin film of glass ($\mu = 1.6$) is interposed in the path of one of the interfering beams of a Michelson's interferometer, a shift of 20 fringes of sodium light ($\lambda = 5893$ A°) is observed across the field of view. Calculate the thickness of the film.

   viii) State Rayleigh's criteria for resolution.

   ix) Define diffraction of light and give its type.

3. A) Attempt **any two** of the following : **10**

   i) State characteristics of double refraction.

   ii) Obtain the relation between the lateral, longitudinal magnifications in terms of the refractive indices and also deduce the relation between the three magnifications.

   iii) Calculate the length of the base of a 60° prism capable of just resolving the sodium lines of wavelength 5896 A° and 5890 A°. The material of the glass has $\mu_C = 1.6545$ and $\mu_E = 1.6635$ for C and E lines in the solar spectrum of wavelength 6563 A° and 5270 A° respectively.

  B) Explain the use of Michelson's interferometer in determination of the difference of wavelengths between the two close components of monochromatic light. **4**

4. Attempt **any two** of the following : **14**

   i) Explain the formation and working of Fibre-optic communication system.

   ii) Derive an expression for the focal length in space for a system of two thin lenses separated co-axially by some distance in air. Also obtain expressions for locating the positions of the principal planes.

   iii) Derive an expression for the resolving power of a plane diffraction grating.

5. Attempt **any two** of the following : **14**

   i) With a neat ray diagram explain the construction and working of a Fabry-Perot interferometer.

   ii) Explain the principle, construction and working of Nicol prism.

   iii) Show that a zone plate acts as a convex lens by considering the source is at (i) infinity (ii) a finite distance.

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Seat
No.

B.Sc. – II (Semester – IV) (New – CGPA Pattern) Examination, 2016
BIOCHEMISTRY (Paper – III)
Nutrition and Metabolism

Day and Date : Tuesday, 26-4-2016   Max. Marks : 70

Time : 2.30 p.m. to 5.00 p.m.

Instructions :   1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Write biochemical reactions **wherever** involved.

1. Write following sentences by selecting most correct answer from the given options.   **14**

   1) During respiration succinate gives its electrons to Co Q_{10} which produces _____ ATPs by oxidative phosphorylation.

      a) 0   b) 2   c) 3   d) 4

   2) End product of citric acid cycle is

      a) Pyruvic acid   b) CO_2 and H_2O

      c) Citrate   d) Oxaloacetate

   3) Knoop in _____ proposed β-oxidation path for oxidation of fatty acids.

      a) 1903   b) 1904   c) 1905   d) 1906

   4) _____ does not inhibit or block electron transport from cytochrome aa_3 to molecular oxygen.

      a) Piericidine   b) Carbon monoxide

      c) Hydrogen sulphide   d) Hydrogen cyanide

   5) PLP cofactor is required for _____ of amino acids.

      a) Decarboxylation   b) Transamination

      c) Deamination   d) Carboxylation

6) Acetyl CoA is transported out of mitochondria in the form of

   a) Acetate
   b) Nitrate
   c) Citrate
   d) Oxalate

7) Ammonia eliminated through urine is mostly derived from

   a) Arginine
   b) Glutamine
   c) Alanine
   d) Aspartic acid

8) Glycogen is a branched

   a) Monosaccharide
   b) Polysaccharide
   c) Disaccharide
   d) Oligosaccharide

9) Elements for which per day nutritional requirements are greater than _____ are referred to as minerals.

   a) 100 milligrams
   b) 100 micrograms
   c) 100 grams
   d) 100 picograms

10) Phenylketonuria (pku) is an inherited disorder in _____ metabolism.

   a) Phenyl aniline
   b) Phenyl urea
   c) Phenyl alanine
   d) Phenyl ketone

11) Osmolarity of intracellular fluid decreases in _____ condition.

   a) Metabolic acidosis
   b) Respiratory alkalosis
   c) Dehydration
   d) Overhydration

12) _____ hormone increases reabsorption of Na^+ ions by renal tubules.

   a) Aldosterone
   b) Insuline
   c) Thyroxine
   d) Antidiuretic

13) Principal use of BMR in clinical practice is in the diagnosis of

   a) Diabetes
   b) Thyroid
   c) Phenylketonuria
   d) Blood pressure

14) The right atrium of heart secrets _____ hormone.

   a) Natriuretic peptide
   b) Aldosterone
   c) Antidiuretic
   d) Renin-angiotensin

2. Attempt **any seven** of the following : **14**

   1) How pyruvic acid obtained from α-ketoglutamate ?

   2) Define respiratory quotient with one example.

   3) Define glycolysis and glycogenolysis.

   4) Write on flavoproteins.

   5) Write two functions of water.

   6) How glycogen is degrade using phosphorolysis.

   7) Write two factors affecting BMR.

   8) Write structure of AMP and ATP.

   9) How acetyl CoA converts malonyl CoA using biotin.

3. A) Attempt **any two** of the following : **10**

   1) Write and explain the reactions of glycogenesis and glycogenolysis.

   2) Illustrate the role of various components involved in electron transport chain.

   3) Discuss the importance of proteins in diet.

   B) What is the effect of hormones of basal metabolic rate ? **4**

4. Answer **any two** of the following : **14**

   1) Write a note on disorders of acid-base balance.

   2) What is high energy molecule ? Explain ATP as a high energy molecule.

   3) What is oxidation of palmitic acid ? Explain β-oxidation and energetics of palmitic acid oxidation.

5. Answer **any two** of the following : **14**

   1) Explain three types of reactions occurred in amino acid metabolism.

   2) Write and explain in brief the reaction of TCA cycle.

   3) What is balanced diet ? Explain carbohydrates, fats and minerals as a constituents of balanced diet.

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Seat No.

B.Sc. – II (Semester – IV) (New CGPA) Examination, 2016
PLANT PROTECTION (Paper – III)
Introduction to Weeds and Non Insect Pests

Day and Date : Tuesday, 26-4-2016
Time : 2.30 p.m. to 5.00 p.m.

Max. Marks : 70

Instructions :
I) **All** questions are **compulsory**.
II) Draw a neat labelled diagram **wherever** necessary.
III) Figures to the **right** indicate **full** marks.
IV) **All** questions carry **equal** marks.

1. Rewrite the correct answer from the given alternatives : **(1×14=14)**

   1) Nematodes are controlled with the help of _____ nematicide.
      a) HCN   b) ACN   c) TCN   d) ICN

   2) Mites belongs to the phyllum
      a) Nematoda   b) Artropoda   c) Chordata   d) All of these

   3) _____ are the example of non-insect pests.
      a) Cows   b) Goats   c) Birds   d) Dogs

   4) The _____ which are used to kill the weeds are called as weedicides.
      a) physical   b) chemical   c) clinical   d) all of these

   5) *Euphorbia hirta* is a
      a) pulse   b) millete   c) cereal   d) weed

   6) *Cyperus rotundus* weed belongs to the family
      a) Cyperaceae   b) Cucurbitaceae
      c) Sapotaceae   d) Zygophyllaceae

   7) The weed found in water body is known as _____ weed.
      a) terrestrial b) aquatic   c) parasitic   d) poisonous

P.T.O.

8) Ploughing method of weed management is the example of _____ method.

   a) cultural   b) biological

   c) chemical   d) physical

9) In *Argemone maxicana*, reproduction takes place by

   a) fragmentation   b) budding

   c) fission   d) seed

10) Classification of weeds is based on

   a) Ontogeny   b) Montogeny

   c) Syngeny   d) Both a) and c)

11) Weeds _____ the productivity of crops.

   a) increase   b) decrease

   c) triple   d) double

12) Vernacular name of *Cynodon dactylon* is

   a) gajar gawat   b) dudhani

   c) katemath   d) harali

13) Vernacular name of *Amaranthus spinosus* is

   a) harali   b) dudhani

   c) gajar gawat   d) katemath

14) _____ is the biological method of weed management.

   a) Fungi   b) Virus

   c) Mycoplasma   d) All of these

2. Answer **any seven** of the following :   **(7×2=14)**

   i) Define weed.

   ii) What is ecology ?

   iii) Define parasitic weed.

   iv) Give the two botanical names of weed.

   v) Define field sanitation.

   vi) What is chemical method of weed control ?

   vii) Give the two uses of 2, 4 – D.

   viii) Define management.

   ix) What is nematode ?

3. A) Answer **any two** of the following : (2×5=10)

   i) Explain the classification of weed based on crop association.

   ii) Give the reproduction of weed studied by you.

   iii) Describe the stem parasite weed studied by you.

   B) Explain the morphology and ecology of *Portulaka oleracea*. **4**

4. Answer **any two** of the followings : (2×7=14)

   i) Explain mode of weed dispersal studied by you.

   ii) Give the classification of weedicides on the basis of chemical nature.

   iii) Explain the *Euphorbia hirta* weed studied by you.

5 Answer **any two** of the followings : (2×7=14)

   i) Explain the non-insect pest birds studied by you.

   ii) Describe the properties and uses of pendimethalin of weedicides.

   iii) Explain the nature of damage and management of snails and slugs.

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Seat No.

B.Sc. – II (Semester – IV) (CGPA Pattern) Examination, 2016
PHYSICS (Paper – VI) (New)
Modern Physics

Day and Date : Wednesday, 27-4-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

N. B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicates **full** marks.
3) **Draw** neat diagrams **wherever** necessary.
4) **Use** of calculator and log tables is **allowed**.

Data given : i) Velocity of light, $c = 3 \times 10^8$ m/s.
ii) Planck's constant, $h = 6.63 \times 10^{-34}$ Js
iii) Rest mass of electron, $m_0 = 9.1 \times 10^{-31}$ kg.

1. Choose and write a correct answer from the given alternatives :   **14**

   i) In nuclear reactor the chain reaction is _____

   a) Uncontrolled   b) Absent   c) Controlled   d) Indefinite

   ii) Spin of electron is _____

   a) $\dfrac{1}{2}$ b) 1   c) 0   d) $\dfrac{1}{4}$

   iii) 'All inertial frames are equivalent' is called principle of _____

   a) Equivalence   b) Inertia
   c) Correspondence   d) Equilibrium

   iv) The maximum change in wavelength of scattered radiation is for scattering angle _____

   a) 90°   b) 0°   c) 45°   d) 180°

   v) According to Bohr's quantum condition _____ of the electron orbit is an integral multiple of electron wavelength.

   a) diameter   b) area   c) radius   d) circumference

P.T.O.

vi) The magnitude of Compton wavelength is _____

    a) $0.0484\,\overset{\circ}{A}$ b) $0.0242\,\overset{\circ}{A}$ c) $0.0122\,\overset{\circ}{A}$ d) $0.0224\,\overset{\circ}{A}$

vii) _____ is the most common type of coupling.

    a) LS   b) JJ   c) LJ   d) SS

viii) Energy released per fission of U^{235} is about _____

    a) 50 MeV   b) 200 MeV   c) 500 MeV   d) 100 MeV

ix) Mass of moving object always _____ with increase in velocity.

    a) remains constant   b) decreases

    c) increases   d) be zero

x) Heisenberg's uncertainty principle is given by _____

    a) $\Delta x \cdot \Delta p \geq \hbar/2$ b) $\Delta x \cdot \Delta t \geq \hbar/2$

    c) $\Delta E \cdot \Delta p \geq \hbar/2$ d) $\Delta p \cdot \Delta t \geq \hbar/2$

xi) Anamalous Zeeman effect is found with _____

    a) Weak magnetic field   b) No magnetic field

    c) Very strong magnetic field   d) Only electric field

xii) The special theory of relativity was developed by _____

    a) Einstein   b) Newton   c) Galileo   d) Lorentz

xiii) A body of mass 0.1 kg is moving with velocity of 10 m/s. Then the wavelength of matter wave associated with it is _____

    a) 66.3×10^{-34} m   b) 6.63×10^{-34} m

    c) 0.663×10^{-34} m   d) 1×10^{-34} m

xiv) The atomic energy programme in India was launched under the leadership of _____

    a) Homi J. Bhabha   b) APJ Abdul Kalam

    c) C.N.R. Rao   d) C. V. Raman

2. Answer **any seven** of the following :   **14**

    1) What is compton effect ?

    2) Write any two neutron induced reactions.

    3) State Pauli's exclusion principle.

4) State any four properties of matter waves.

5) Define inertial frame of reference.

6) Define : a) phase velocity   b) group velocity.

7) What do you mean by JJ coupling ?

8) What is nuclear fission ?

9) Compute the energy released on conversion of 500 g of mass into energy.

3. A) Attempt **any two** of the following :   **10**

   1) Describe the experimental verification of Compton effect.

   2) Derive an expression for variation of length with velocity.

   3) Explain in brief the concepts of

      a) Space quantization

      b) Spin hypothesis.

   B) Find the change in wavelength of an X-ray photon when it is scattered through
      an angle of 60° by a free electron.   **4**

4. Attempt **any two** of the following :   **14**

   1) Derive the relation between group velocity and phase velocity.

   2) Explain in detail Michelson-Morley experiment and comment on the negative
      result.

   3) Describe the experimental study of normal Zeeman effect.

5. Attempt **any two** of the following :   **14**

   1) Describe a typical nuclear reactor with its essential parts.

   2) Explain quantum numbers associated with vector atom model.

   3) At what speed will the mass of a body be three times its rest mass.

_____

Seat No.

B.Sc. – II (Semester – IV) (New-CGPA) Examination, 2016
BIOCHEMISTRY
Molecular Biochemistry and Diseases (Paper – IV)

Day and Date : Wednesday, 27-4-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

N. B. :   1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **maximum** marks.
3) **Draw** Biochemical reactions/labelled diagrams **wherever** necessary.

1. Write following sentences by selecting most correct answer from given options : **14**

   1) Template strand is present in _____
      a) Reverse transcriptase   b) Ribosome
      c) tRNA   d) DNA

   2) The synthesis of proteins using genetic information on DNA is called as _____
      a) Transcription   b) Transformation
      c) Translation   d) Transition

   3) Biochemical indicators used to detect the presence of cancer are collectively called as _____
      a) DNA markers   b) Tumor markers
      c) Tumor sensor   d) Tumor monitors

   4) Racial differences in immunology are _____ in origin.
      a) Physiological   b) Temporary
      c) Genetic   d) Artificially acquired

   5) _____ contains many unusual bases in its structure.
      a) r-RNA   b) m-RNA
      c) t-RNA   d) c-RNA

   6) The most commonly used vector of E. Coli is _____
      a) α-phase   b) λ-phase
      c) β-phase   d) ω-phase

P.T.O.

7) In diabetes mellitus function of _____ hormone is not normal.

   a) Insulin   b) Thyroxine

   c) Growth   d) Adrenaline

8) Genetic code is _____

   a) Random   b) Different for different individuals

   c) Specific species   d) Universal

9) For cleavage of DNA, type II endonucleoses requires _____

   a) Fe^{2+} b) Ca^{2+}

   c) Mg^{2+} d) Mn^{2+}

10) Tears contain _____

   a) Zylosome   b) Lysozyme

   c) Acetylase   d) Polymerase

11) Molecular weight of r-RNA ranges between _____ million.

   a) 0.5 to 1.5   b) 1.5 to 2.5

   c) 2.5 to 3.5   d) 3.5 to 4.5

12) Azidothymidine (AZT) drug used in AIDS is _____ drug.

   a) Protein inhibitor   b) Membrane transport inhibitor

   c) Nucleoside analogue   d) c-AMP inhibitor

13) Juvenile onset diabetes occurs particularly between _____ years.

   a) Above 35 years   b) 20-35 years

   c) 60-75 years   d) 1-15 years

14) Hin d II enzyme cut circular DNA of SV 40 into _____ fragments.

   a) 9   b) 10

   c) 11   d) 12

2. Answer **any seven** of the following :   **14**

   1) How are the antibodies obtained for artificial passive immunity ?

   2) What is difference between a nucleoside and a nucleotide ?

   3) State various natural modes of genetic recombination.

4) How is proinsulin converted into insulin ?

5) How does the repression of lac operon gene takes place ?

6) How is polynucleotide formed from nucleotide ?

7) Write three applications of recombinant DNA technology.

8) How biochemical changes occur in growing tumor cells ?

9) How does Azidothymidine (AZT) acts on HIV ?

3. A) Answer **any two** of the following : **10**

   1) Explain morphological changes and biochemical changes in growing tumor cells.

   2) Explain natural course of AIDS.

   3) Explain gene cloning technology.

   B) Write the applications of genetic engineering. **4**

4. Answer **any two** of the following : **14**

   1) Explain structure and formation of insulin from preproinsulin. What are the factors for stimulating insulin secretion ?

   2) Explain replication of DNA.

   3) Discuss in details about restriction endonucleoses.

5. Answer **any two** of the following : **14**

   1) Write note on natural (innate) immunity and explain mechanism of innate immunity.

   2) What is transcription ? Explain steps involved in transcription.

   3) What is genetic code ? Explain general features of genetic code.

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Seat
No.

B.Sc. – II (Semester – IV) (New CGPA) Examination, 2016
PLANT PROTECTION
Paper – IV : Insect Pests and Their Management

Day and Date : Wednesday, 27-4-2016 — Total Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Draw **neat** and labelled diagrams **wherever** necessary.
3) Figures to the **right** indicate **full** marks.
4) **All** questions carry **equal** marks.

1. Select the correct answer and rewrite the sentences : **(1×14=14)**

1) The life cycle of insect includes _____ stages.
   a) egg   b) pupa   c) larva   d) all the above

2) Classification of insecticides is based on
   a) mode of entry   b) mode of action
   c) chemical nature   d) all the above

3) The scientific name of mango is
   a) *Sorghum vulgare*   b) *Magnifera indica*
   c) *Arachys hypogaea*   d) None of these

4) Stem borer is the pest of
   a) gram   b) mango   c) tomato   d) jowar

5) Thrips are the pests of
   a) gram   b) stored grain
   c) rose   d) all the above

6) Classification of insect pests is based on
   a) nature of damage   b) mouth parts
   c) metamorphosis   d) all the above

7) Plant origin insecticides are also known as _____ pesticides.
   a) synthetic   b) botanical   c) microbial   d) both a and b

P.T.O.

8) For the management of pests _____ are used.
   a) filters
   b) alcohol
   c) both a and b
   d) antifeedents

9) Insecticide formulations include
   a) dusts
   b) concentrates
   c) wettable powder
   d) all the above

10) Organophosphate is the _____ insecticide.
    a) organic
    b) inorganic
    c) synthetic
    d) none of these

11) *Cicer arietinum* is the scientific name of
    a) tomato
    b) jowar
    c) gram
    d) none of these

12) _____ is not the pest of crop plants.
    a) Rice weevil
    b) Stem borer
    c) Pod borer
    d) White grub

13) Insecticides are generally harmful to _____ systems of pests.
    a) nervous
    b) respiratory
    c) digestive
    d) both a and b

14) _____ is the source of plant insecticides.
    a) *Chrysanthemum* sp
    b) *Nicotiana* sp
    c) Both a and b
    d) Mango

2. Answer **any seven** of the followings :   (2×7=14)

   i) Write the nature of damage caused by jassids.

   ii) Define attractants.

   iii) Write the life cycle stages of pulse beetle.

   iv) Give the host range of thrips.

   v) Name the inorganic insecticides.

   vi) State the control measures of fruit borer.

   vii) Write the marks of identifications of red spider.

   viii) State the kinds of insect formulations.

   ix) Define insect pest.

3. A) Answer **any two** of the followings : (2×5=10)

    i) Explain the classification of insect pests based on mouth parts.

    ii) Describe the life cycle, carryover and nature of damage of pod borer.

    iii) Explain the general characters of insects with respect to abdomen.

    B) Classify the insecticides based on chemical nature. **4**

4. Answer **any two** of the followings : (2×7=14)

    i) Explain the host range, nature of damage and control of rice weevil.

    ii) Classify the insecticides based on mode of entry.

    iii) Add a note on principles of pest control.

5. Answer **any two** of the followings : (2×7=14)

    i) Add a note on quantitative loss caused by insect pests.

    ii) Explain the role of repellents in pest management.

    iii) Describe the safety precautions to be taken while applying the pesticides.

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Seat
No.

B.Sc. – II (Semester – IV) (CGPA) Examination, 2016
STATISTICS (Paper – V) (New)
Continuous Probability Distributions and Exact Probability Distributions

Day and Date : Thursday, 28-4-2016   Max.Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions : 1) **All** questions are **compulsory** and carry **equal** marks.

2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative :   **14**

   1) Gamma frequency curve is

      a) Positively skewed   b) Negatively skewed

      c) Symmetric   d) None of these

   2) Suppose X, Y and Z are three independent G(4, 2), G(4, 4), G(4, 3) variates
      respectively then the distribution of W = X + Y + Z is

      a) G(4, 9)   b) G(9, 4)   c) G(12, 9)   d) G(9, 12)

   3) If $X \sim \beta_2(m, n)$ then mean of X is

      a) $\dfrac{m}{n-1}$ b) $\dfrac{n-1}{m}$ c) $\dfrac{n}{m-1}$ d) $\dfrac{m-1}{n}$

   4) If $X \sim \beta_2(m, n)$ then distribution of 1/X is

      a) $\beta_1(m, n)$ b) $\beta_2(n, m)$ c) $\beta_2(m, n)$ d) $\beta_1(n, m)$

   5) If X is a normal variables with $\mu = 200$ and $P(X > 225) = 0.1587$ then $P(X < 175)$
      is equal to

      a) 0.3141   b) 0.8413   c) 0.1587   d) 0.5

   6) The shape of a normal curve depends upon the value of

      a) Standard deviation   b) Lower quartile

      c) Mean deviation   d) Upper quartile

7) Student's t distribution is due to

   a) G. W. Snedecor   b) R. A. Fisher

   c) W. S. Gosset   d) Karl Pearson

8) Range of F variate is

   a) $(0,\infty)$ b) $(0, 1)$ c) $(-\infty, \infty)$ d) $(-1, -1)$

9) The relation between mean and variance of Chi square distribution is

   a) mean = 2 variance   b) 2 mean = variance

   c) mean = variance   d) none of these

10) If X and Y are independent Chi square variates with n_1 and n_2 d.f. respectively then the r.v. $\dfrac{X}{Y}$ is

   a) $\beta_1(n_1/2, n_2/2)$ b) $\beta_1(n_2/2, n_1/2)$

   c) $\beta_2(n_1/2, n_2/2)$ d) $\beta_2(n_2/2, n_1/2)$

11) The relation between Student's t and Snedecor's F variates is

   a) $F_{(1,1)} = t_n^2$ b) $F_{(1, n)} = t_n^2$ c) $F_{(n, 1)} = t_n^2$ d) $F_{(n, n)} = t_n^2$

12) If X is t variate with 5 d.f. then Var(X) is

   a) 3/5   b) 4/5   c) 5/3   d) 3/4

13) If X is a t variate with 5 d.f. then mean of X is

   a) 5   b) 0   c) 10   d) None of these

14) If F ~ F (10, 11) and Y = 1/F then mean of Y is

   a) 11/10   b) 11/9   c) 5/4   d) 11/8

2. Attempt **any seven** :   **14**

   1) State mean and variance of gamma distribution with parameters $\alpha = 5$ and $\lambda = 8$.

   2) If X ~ G(8, 2) then identify the distribution of 4X.

   3) Define beta distribution of first kind.

   4) Give the definition of beta distribution of second kind.

   5) State the quartiles of S.N.V.

6) State the m.g.f. of N(0, 1).

7) Let X and Y be i.i.d. N(0, 1) then state the distribution of $Y = X\sqrt{2}/\sqrt{X^2 + Y^2}$.

8) Let X_i (i = 1, 2, 3, 4) be independent S.N.Vs. Identify the distribution of $Y = 3X_4^2/\left(X_1^2 + X_2^2 + X_3^2\right)$.

9) Define Chi square distribution with 1 d.f.

3. A) Attempt **any two** : **10**

    1) Find the m.g.f. of $G(\alpha, \lambda)$.

    2) If X ~ N (0, 1), find the distribution of X^2.

    3) Define Student's t distribution with n d.f. and state its mean and variance.

B) Find the m.g.f. of Chi square distribution with n d.f. **4**

4. Attempt **any two** : **14**

    1) Find the distribution of X/Y, where $X \sim G(\alpha, \lambda_1)$, $Y \sim G(\alpha, \lambda_2)$ and X and Y are independent.

    2) Derive the p.d.f. of Chi square distribution with n d.f.

    3) Find mean and variance of $G(\alpha, \lambda)$.

5. Attempt **any two** : **14**

    1) Find mean and mode of F variate with (n_1, n_2).

    2) Find mean and variance of $\beta_2(m, n)$.

    3) State and prove additive property of normal distribution.

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Seat No.

B.Sc. – II (Semester – IV) (CGPA) Examination, 2016
METEOROLOGY (Paper – III)
Applied Climatology (New)

Day and Date : Thursday, 28-4-2016

Max. Marks : 70

Time : 2.30 p.m. to 5.00 p.m.

Note : 1) *All* questions are *compulsory*.

2) *Figures to the* ***right*** *indicate* ***full*** *marks.*

3) *Draw* ***neat*** *diagrams* ***wherever*** *necessary.*

4) ***Use*** *of stencils is* ***allowed****.*

1. Choose the correct alternative. **14**

    1) Along the Arctic Ocean, thick fog is also called as Arctic _____ or Sjoroyk.

    (smoke, fog, haze, mist)

    2) Grand banks are noted for shipping hazards due to _____ and icebergs.

    (mist, fog, rime, haze)

    3) Shelter is a protection provided by man to protect him from sever _____ conditions..

    (rainfall, snowfall, temperature, weather)

    4) One millibar is a unit of force equal to 1000 _____ per centimeter square.

    (volts, juel, amps, dyne)

    5) Indian Meteorological services use linear equations to forecast the arrival of the _____.

    (winter, summer, monsoon, autumn)

6) Winds with permanent directions play important role in determining the direction of a _____.

(roads, runways, waterways, railways)

7) Urban areas experience high temperature regions called as _____ islands.
(heat, cold, cool, warm)

8) _____ transport has most complex relationship with atmospheric conditions.
(land, water, aviation, pipelines)

9) As per world meteorological observations, there should be one primary data center at every _____ kilometer.
(200, 150, 100, 50)

10) The east coast of all continents experiences upwelling of the sea water due to _____ surface winds.
(steady, moderate, strong weak)

11) Plantation agriculture is confined to _____ region due to climatic conditions.
(equatorial , monsoonal, alpine, boreal)

12) Prebaratic charts are necessary for _____ a weather.
(record, forecasting, analysis, observations)

13) Satellites are most useful for _____ forecasting.
(climate, weather, paleoclimate, projected climate)

14) The observations of both surface and _____ air network of stations are required for weather.
(topmost, upper, lower, central)

2. Write in short (**any 5**) : **15**

1) Define The term 'Weather'.

2) Types of weather forecasting.

3) Define the term 'Heat island'.

4) What is Coriolis effect ?

5) What is air pollution ?

6) Define the term atmospheric pressure.

3. Answer **any three** questions. **15**

   1) Explain the importance of forecasting.

   2) State the effects of Coriolis Force.

   3) Explain the importance of climate on industrial activities.

   4) Describe the relation between agriculture and climate.

4. Write in short **(any 3)**. **15**

   1) Importance of satellites in climatology.

   2) Effects of local winds on weather.

   3) Physiological response to temperature.

   4) Marine fishing and climate.

5. A) Write **any one** answer. **6**
   1) Explain the importance of climate in agriculture.
   2) Describe the effects of climate on fishing industry.

   B) Write a **(any one)** brief answer. **5**

   1) Explain the importance of climatic study in industrial development.

   2) Correlate the importance of air operations in telecommunications.

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SLR-W – 135

Seat
No.

B.Sc. – II (Semester – IV) (New CGPA) Examination, 2016
GEOCHEMISTRY
Principles of Geochemistry (Paper – III)

Day and Date : Thursday, 28-4-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
                2) Figures to the **right** indicates **full** marks.
                3) Draw **neat** diagrams **wherever** necessary.

1. Choose the most correct alternative **each** of the following :   **14**

    1) Lechatelier's principle is applicable for _____ reaction.

        a) irreversible   b) reversible

        c) fast   d) none of these

    2) pH of ocean water is

        a) 7.3   b) 8.3   c) 9.3   d) 10.3

    3) Petroleum is a mixture of

        a) hydrocarbon   b) nitrogroup   c) aminogroup   d) none of these

    4) The name of CH_3OH is

        a) acetone   b) ethyl alcohol c) methanol   d) aldehyde

    5) According to Lewis theory, acid is

        a) electron donar   b) proton donar

        c) electron acceptor   d) proton acceptor

    6) Alkenes contains _____ bonds.

        a) single   b) double   c) triple   d) none of these

    7) Dispersion of solid in liquid is called as

        a) sol   b) gel

        c) emulsion   d) collidal solution

P.T.O.

8) _____ process is slow process.

   a) irreversible   b) reversible

   c) fast   d) none of these

9) Tyndall effect is an example of _____ property.

   a) optical   b) electrical

   c) mechanical   d) chemical

10) The name of CH_3OH is

   a) acetone   b) ethyl alcohol

   c) methanol   d) aldehyde

11) The acidic rock contains high % of

   a) FeO   b) NaO   c) SiO_2 d) MgO

12) An exothermic reaction favors _____ in temperature.

   a) decrease   b) increase   c) no change   d) none of these

13) In electrophoresis _____ used as a semipermeable membrane.

   a) parchment paper   b) filter paper

   c) glass   d) none of these

14) The name of $(CO_3)^{2-}$ group is

   a) carbonate   b) alkane

   c) hydrocarbon   d) none of these

2. Answer **any seven** of the following :   **14**

   i) Define chemical equilibrium.

   ii) Define acid and base according to Arrhenius theory.

   iii) Give any two geological uses of acids.

   iv) Define emulsion. Give one example.

   v) Discuss the effect of temperature on the reaction $H_2 + Cl_2 = 2HCl + Heat$.

   vi) Give the molecular formula of cyclohexane and glysine.

   vii) Define functional group. Give the formula of aldehyde.

   viii) Draw the structure of $(SiO_4)^{4-}$.

   ix) Define p^H and p^{OH}.

3. A) Answer **any two** of the following : **10**

   i) State and explain law of mass action.

   ii) Discuss the hydrolysis of Sodium carbonate.

   iii) Discuss the types of hydrocarbon in petroleum.

   B) Distinguish between Sol and Gel. **4**

4. Answer **any two** of the following : **14**

   i) Show that chemical equilibrium is dynamic in nature for the reaction

   $N_2 + 3H_2 = 2 NH_3$.

   ii) How the concentration of $(HCO_3)^-$ and $(CO_3)^{2-}$ are estimated from hydrolysis of Na_2CO_3.

   iii) Write a short note on origin of Coal.

5. Answer **any two** of the following : **14**

   i) State and explain Lechatelier's principle.

   ii) Write a short note on Silica as a chemical sediment.

   iii) Discuss the origin of petroleum.

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Seat No.

B.Sc. (Part – II) (Semester – IV) (New – CGPA) Examination, 2016
ZOOLOGY (Paper – V)
Animal Diversity – IV

Day and Date : Thursday, 28-4-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

N.B. : 1) *All* questions are *compulsory*.
        2) *Figures to the* *right* indicate *full* marks.
        3) *Draw* *neat* labelled diagrams *wherever* necessary.

1. Select the appropriate answer and rewrite the sentences :   **14**

    1) Rat belongs to order _____

       a) Rodentia   b) Squamata   c) Cetacea   d) Anura

    2) In case of birds, the endoskeleton is _____

       a) solid   b) heavy   c) pneumatic   d) absent

    3) Bile is secreted by _____

       a) Pancreas   b) Liver   c) Testes   d) Salivary glands

    4) Pulmonary artery carry _____ blood to the lungs.

       a) Oxygenated   b) Mixed   c) Pure   d) Deoxygenated

    5) In poisonous snake the poison gland is _____ shaped.

       a) Diamond   b) Sickle   c) Almond   d) Pea

    6) _____ is connecting link between reptiles and birds.

       a) Archaeopteryx   b) Peripatus
       c) Monotremes   d) Marsupium

    7) Migration of birds from North to South and Vice-Versa is called _____ migration.

       a) Longitudinal   b) Latitudinal   c) Seasonal   d) Altitudinal

P.T.O.

8) The mesozoic reptile, Ichthyosaurus the body form was like _____
   a) Frog   b) Snake   c) Bird   d) Fish

9) Fruit eating beak is found in _____
   a) Parrot   b) Vulture   c) Wood pecker   d) Heron

10) _____ is egg laying mammal.
   a) Dog   b) Monotreme   c) Rabbit   d) Rat

11) In rat RBCs are _____
   a) Nucleated   b) Binucleated   c) Non-nucleated d) Multinucleated

12) Swimming type of feet are present in _____
   a) Sparrow   b) Lapwing   c) Fowl   d) Duck

13) Keen sight is found in _____
   a) Birds   b) Reptiles   c) Mammals   d) Amphibians

14) Organ concerned for smell is _____
   a) optic lobe   b) olfactory lobe
   c) cerebral hemisphere   d) medulla oblongata

2. Answer **any seven** of the following :   **14**

   i) Salient features of reptiles.

   ii) Perching type of feet in birds.

   iii) Egg laying mammal.

   iv) Archaeopteryx.

   v) Any one Mesozoic reptile.

   vi) Leg in woodpecker.

   vii) Systematic position of rat.

   viii) Dental formula of man.

   ix) Scrotum of rat.

3. A) Answer **any two** of the following :   **10**
   i) Describe salient features of marsupials.
   ii) Give functions of brain of rat.
   iii) Enlist different types of beaks found in birds.

   B) Give functions of blood of rat.   **4**

4. Answer **any two** of the following : **14**

   i) Describe lungs of rat.

   ii) Describe kinds of migration in birds.

   iii) Describe first-aid treatment in snake bite.

5. Answer **any two** of the following : **14**

   i) Describe the digestive system of rat.

   ii) Describe aerial adaptations in birds.

   iii) Describe eye of rat as a sense organ.

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Seat No.

B.Sc. – II (Semester – IV) (New – C.G.P.A. Pattern) Examination, 2016
STATISTICS (Paper – VI)
Applied Statistics

Day and Date : Friday, 29-4-2016   Total Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions :   i) ***All*** questions are ***compulsory***.
                         ii) *Figure to the* ***right*** *indicates* ***full*** *marks.*

1. Choose the correct alternative :   **14**

   i) Probability of including a specified unit in a sample of size n selected out of N units is

   a) $\dfrac{1}{n}$ b) $\dfrac{1}{N}$ c) $\dfrac{n}{N}$ d) $\dfrac{N}{n}$

   ii) A sample consist of
      a) all units of the population
      b) 50 percent units of the population
      c) 5 percent units of the population
      d) any part of the population

   iii) The number of all possible samples of size 2 from a population of 4 units by SRSWOR is
      a) 2   b) 4   c) 8   d) 6

   iv) Probability of drawing an unit at any draw remains same in
      a) SRSWOR   b) SRSWR
      c) Both a) and b)   d) None of these

   v) Level of significance is the probability of
      a) Type I error   b) Type II error
      c) Not committing error   d) None of these

   vi) Type – II error is
      a) Rejecting H_0 when H_0 is wrong   b) Rejecting H_0 when H_0 is true
      c) Accepting H_0 when H_0 is wrong   d) Accepting H_0 when H_0 is true

P.T.O.

vii) A hypothesis may be classified as

    a) Simple   b) Composite

    c) Null   d) All of these

viii) For testing a population variance which of the following test to be used ?

    a) Z-test   b) t-test

    c) Chi-square test   d) F-test

ix) For testing goodness of fit _____ test is used.

    a) Normal   b) F   c) t   d) Chi-square

x) Student's t-test is applicable in case of _____ sample size.

    a) large   b) for any

    c) small   d) none of these

xi) Equality of two population variances can be tested by

    a) Z-test   b) F-test   c) χ^2-test   d) t-test

xii) Chance variation in the manufactured product is _____

    a) Controllable   b) Uncontrollable

    c) Both a) and b)   d) None of these

xiii) If μ and σ are process mean and standard deviation respectively, then 3σ control limits are given by

    a) $\mu \pm \sigma$ b) $\mu \pm 3\sigma$

    c) $\mu \pm 2\sigma$ d) None of these

xiv) The death rate obtained for a segment of a population is known as

    a) Specific death rate   b) Crude death rate

    c) Standardized rate   d) Vital index

2. Attempt **any seven** of the following :   **14**

    i) Define :

        a) Population

        b) Sample.

    ii) Describe probability sampling.

    iii) Define alternative hypothesis.

    iv) Define Type-I error.

    v) State central limit theorem.

vi) Explain the term defect.

vii) What is product control ?

viii) Define CDR.

ix) Explain the need of vital statistics.

3. A) Attempt **any two** of the following : **10**

   i) Distinguish between SRSWR and SRSWOR.

   ii) Distinguish between chance causes and assignable causes of variation.

   iii) Describe the procedure to test for testing population mean $\mu = \mu_0$ based on t-distribution.

   B) Define General Fertility Rate (GFR). Also state the merits and demerits of GFR. **4**

4. Attempt **any two** of the following : **14**

   i) Show that in case of SRSWOR, expected value of sample mean square is the population mean square.

   ii) Give the 3σ control limits for p-chart when standard are not given. Also explain the working of p-chart.

   iii) Define Gross Reproduction Rate (GRR) and Net Reproductive Rate (NRR). Also state the limitations of GRR.

5. Attempt **any two** of the following : **14**

   i) With usual notations, prove that for SRSWR

   $$V(\bar{y}_n) = \frac{N-1}{Nn} S^2$$

   ii) Explain the criteria of detecting lack of control in $\bar{X}$ and R charts.

   iii) Describe the procedure for testing $H_0 : \mu = \mu_0$ and $H_0 : \mu_1 = \mu_2$ based on normal distribution.

Seat No.	

B.Sc. – II (Semester – IV) (New CGPA) Examination, 2016
METEOROLOGY
Meteorological Instruments (Paper – IV)

Day and Date : Friday, 29-4-2016　　　　　　　　　　　Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Figures to the **right** indicate **full** marks.
　　　　　　　　3) **Neat** diagrams must be drawn **wherever** necessary.
　　　　　　　　4) Use of **scientific** calculator and **log table** is **allowed**.

1. Choose and write a correct answer from given alternatives.　　　　**14**

   i) The float gauge is used to measure _____

   　a) Sunshine　　　b) Rainfall　　　c) Radiations　　　d) Humidity

   ii) For automatic recording of rainfall _____ is used.

   　a) Anemograph　　b) Hydrograph　　c) Barograph　　d) Float gauge

   iii) A _____ is used for the measurement of temperature.

   　a) Thermometer　　b) Barometer　　c) Anemometer　　d) Hygrometer

   iv) A temperature of 0°C is equal to _____ ^{0}F.

   　a) – 40　　　　b) 0　　　　c) 32　　　　d) 80

   v) A temperature of 100°C is equal to _____ ^{0}F.

   　a) 80　　　　b) 212　　　　c) 373　　　　d) 672

   vi) The relation connecting Kelvin's scale and Celsius scale is _____

   　a) $K = C + 273$　　b) $K = C – 273$　　c) $K = 273 * C$　　d) $K = 273/C$

P.T.O.

vii) The lines joining places of equal _____ are called isobars.

    a) Temperature   b) Pressure

    c) Humidity   d) Wind speed

viii) Aneroid barometer is used to measure atmospheric _____

    a) Density   b) Pressure

    c) Temperature   d) Volume

ix) Wind is _____ in motion.

    a) Atmosphere   b) Weather

    c) Climate   d) Air

x) _____ is a flowing wave of air, moving hither and thither indefinitely.

    a) Wind   b) Weather

    c) Climate   d) Atmosphere

xi) Unit of wind velocity is _____

    a) ^0C b) Km/hr

    c) mb   d) g/cm^3

xii) The instrument used to detect direction of wind is known as _____

    a) Wind vane   b) Barometer

    c) Thermometer   d) Hygrometer

xiii) The instrument used to measure humidity is known as _____

    a) Thermometer   b) Hygrometer

    c) Barometer   d) Hydrometer

xiv) The arrangement of two dissimilar metals forming two junctions is known as _____

    a) Thermograph   b) Thermopile

    c) Thermocouple   d) Thermometer

2. Solve **any seven** of the following : **14**

   i) Describe different types of rain gauges.

   ii) Obtain interrelation between different temperature scales.

   iii) Why mercury is used in thermometer ?

   iv) What is a barometer ?

   v) What are advantages of a barograph over a Fortin's barometer ?

   vi) What is an anemometer ?

   vii) What are advantages of anemograph over an anemometer ?

   viii) How relative humidity is measured using dry and wet bulb thermometers ?

   ix) What is humidity ?

3. A) Attempt **any two** of the following : **10**

   i) With neat diagram explain construction and working of ordinary rain gauge.

   ii) Draw neat labeled diagram of mercury barometer. Describe its construction and working.

   iii) With neat diagram explain construction and working of hair hygrometer.

   B) Calculate atmospheric pressure in mb if reading of Fortin's barometer is 27 inch. (Given : density of Hg = 13.6 g/cc). **4**

4. Attempt **any two** of the following : **14**

   i) With neat diagram explain the construction and working of automatic siphon gauge.

   ii) With neat diagram explain construction and working of mercury thermometer.

   iii) Write a note on radiation pyrometer.

5. Attempt **any two** of the following : **14**

   i) Write a note on thermocouple.

   ii) With neat diagram explain construction and working of cup anemometer.

   iii) With neat labeled diagram explain construction and working of Barograph.

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Seat No.

B.Sc. – II (Semester– IV) (New CGPA) Examination, 2016
GEOCHEMISTRY
Chemistry of the Earth (Paper – IV)

Day and Date : Friday, 29-4-2016

Max. Marks : 70

Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** labelled diagrams **wherever** necessary.
4) Answer to both Sections should be written in **same** answer book.

1. Fill in the blanks with correct answer from given options : **14**

1) The amount of CO_2 in the soil is _____

   a) 0.001   b) 1.03   c) 0.3   d) 1.02

2) _____ are formed by adding oxides or chlorides of Na and alkaline earth material.

   a) Mont Morillonite   b) Illite

   c) Kaolinite   d) China clay

3) Mantle is mainly made up of _____ silicate.

   a) Mg-Fe   b) Ni-Fe

   c) Mn-Fe   d) Na-Fe

4) Biological Oxygen Demand (BOD) for pure water is _____ ppm.

   a) 4   b) 3   c) 2   d) 1

5) Soil whose dimensions are between _____ mm is silty soil.

   a) 2 and 0.2   b) 0.2 and 0.02

   c) 0.02 and 0.002   d) < 0.002

P.T.O.

6) Smectite type of clay structure has _____ layers.

   a) 1   b) 2   c) 3   d) 4

7) Pyroxene mineral convert to _____ mineral by oxidation and hydration.

   a) Kaolinite   b) Smectite   c) Goethite   d) Calcite

8) 'B' soil horizon is characterised by accumulation of leached elements from _____ horizon.

   a) R   b) D   c) C   d) A

9) Core is mainly made up of

   a) Mg-Fe   b) Ni-Fe   c) Mn-Fe   d) Na-Fe

10) The process involving gain of electrons is known as

   a) oxidation   b) reduction   c) potential   d) reductant

11) _____ soil horizon is rich in organic matter (humus).

   a) A   b) C   c) D   d) R

12) Marine clays are mainly of _____ type.

   a) Illite   b) Kaolinite

   c) China clay   d) Mont Morillonite

13) The most susceptible mineral to chemical weathering is

   a) Muscovite   b) Topaz   c) Olivine   d) Quartz

14) If pH of the soil is 5 then the soil is said to be

   a) acidic   b) alkaline   c) basic   d) neutral

2. Answer **any seven** of the following :   **14**

   i) What is hydrogen ion concentration in pure water at 25° C ?
   ii) Name the air pollutants.
   iii) What is humus in soil ?
   iv) Mineral susceptibility sequence for chemical weathering.
   v) Explain role of particulate matter in air pollution.
   vi) What is mollisol soil ?
   vii) Name soil pollutants.
   viii) What is gravitational differentiation ?
   ix) Define pollution.

3. A) Write short notes on **any two** of the following : **10**
   i) Eh and pH.
   ii) Processes of chemical weathering.
   iii) Describe Eh and pH diagram.

   B) What are factors controlling soil formation ? **4**

4. Answer **any two** of the following : **14**
   i) Describe various soil texture.
   ii) Explain soil pollution.
   iii) Describe smectite structure.

5. Answer **any two** of the following : **14**
   i) Explain physicochemical system of the earth.
   ii) Explain air pollution.
   iii) Describe water pollution.

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Seat No.

B.Sc. – II (Semester – IV) (New) (CGPA Pattern) Examination, 2016
ZOOLOGY (Paper – VI)
Histology and Physiology

Day and Date : Friday, 29-4-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

N.B. : 1) **All** questions are **compulsory.**
          2) Figures to **right** indicate **full** marks.
          3) **Draw** neat labelled diagram **wherever** necessary.

1. Complete the sentence selecting appropriate answer.   **14**

   1) _____ tissue is the firstly evolved in the animal kingdom.

      a) Nervous   b) Muscular   c) Epithelial   d) Connective

   2) The packing structure in nervous tissue is called

      a) Cyton   b) Axon   c) Dendrites   d) Neuroglia

   3) The part of the tooth which projects above the surface of the jaw is called as

      a) Crown   b) Neck   c) Root   d) Cervix

   4) The thickest muscular coat is present in the _____ region of the alimentary canal.

      a) Oesophagus   b) Stomach
      c) Small intestine   d) Large intestine

   5) Exocrine part of pancreas secretes

      a) bile   b) pancreatic juice
      c) intestinal juice   d) saliva

   6) The podocytes are present in the

      a) renal capsule   b) uterus
      c) collecting tubule   d) loop of Henle

   7) Luteotropic Hormone (LTH) is also known as

      a) luteinizing hormone   b) prolactin
      c) progesterone   d) estrogen

8) Duration of the estrous cycle is _____ days.

    a) 5   b) 10   c) 15   d) 28

9) The process of termination of pregnancy is called as

    a) menstruation   b) lactation

    c) parturation   d) misturation

10) The cellular immunity involves in

    a) B-lymphocytes   b) T-lymphocytes

    c) A-lymphocytes   d) Z-lymphocytes

11) Defensive mechanism of body is called as

    a) Clearity   b) Immunity   c) Community   d) Variety

12) Hcl is secreted by

    a) Chief cells   b) Argentaffin cells

    c) Mucous cells   d) Oxyntic cells

13) Embryonic RBCs are manufactured in

    a) pancreas   b) stomach   c) liver   d) intestine

14) Colostrum is secreted by breast contains

    a) milk   b) milk with sugar

    c) milk with salt   d) milk without fat

2. Answer **any seven** of the following.   **14**

    i) Structure of squamous epithelium

    ii) IUD

    iii) Structure of antibody

    iv) Amniocentesis

    v) Seminiferous tubule

    vi) Nephron

    vii) Estrogen

    viii) Draw neat labelled diagram of T.S. of spinal cord

    ix) TTB.

3. A) Attempt **any two** of the following. **10**

   i) Describe the histological structure of Graaffian follicle.

   ii) Explain the chemical methods of contraceptives.

   iii) Describe the structure and functions of striated muscle.

   B) Write about hormones secreted by Adenohypophysis. **4**

4. Attempt **any two** of the followings. **14**

   i) Describe the structure of bony tissue.

   ii) Describe histology of stomach.

   iii) Explain male sex hormones.

5. Attempt **any two** of the following. **14**

   i) Describe the histological structure of liver.

   ii) Define menstruation. Explain different changes of all phases of menstrual cycle.

   iii) Describe the estrous cycle.

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Seat
No.

B.Sc. – II (Semester – IV) (CGPA Pattern) Examination, 2016
MATHEMATICS (Paper – V) (New)
Differential Equation

Day and Date : Saturday, 30-4-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions* :** 1) ***All questions are ***compulsory***.
                        2) *Figures to the **right** indicate **full** marks.*

1. Select the correct alternative for each of the following :   **14**

   1) The general solution of $x^2p^2 + 3xyp + 2y^2 = 0$ is
      a) $(x – c)(y – c) = 0$ b) $(y – c)(x^2 – c) = 0$
      c) $(xy – c)(x^2y – c) = 0$ d) $(xy – c)(y – c) = 0$

   2) Solution of differential equation $p^2 – 7p + 12 = 0$ is
      a) $(y + 4x – c)(y + 3x – c) = 0$ b) $(y – 4x – c)(y + 3x – c) = 0$
      c) $(y – 4x – c)(y – 3x – c) = 0$ d) None of these

   3) The differential equation of the form $e^{by}(a – bp) = f(pe^{by–ax})$ reduces to Clairaut's form by the substitution
      a) $e^x = u,\ e^y = v$ b) $e^{–ax} = u,\ e^{by} = v$
      c) $e^{ax} = u,\ e^y = v$ d) $e^{ax} = u,\ e^{by} = v$

   4) The C.F. of the differential equation $x^2 \dfrac{d^2y}{dx^2} + x \dfrac{dy}{dx} – 4y = x^2$ is

      a) $y = c_1x^2 + \dfrac{c_2}{x}$ b) $y = c_1x^2 + \dfrac{c_2}{x^2}$

      c) $y = c_1x + c_2$ d) $y = c_1x^2 + c_2$

   5) Homogeneous linear differential equation with variable coefficient can be reduced to linear differential equation with constant coefficient by changing the independent variable x to z by using the substitution
      a) $x = e^{–z}$ b) $x = e^z$ c) $z = e^x$ d) $z = e^{–x}$

P.T.O.

6) The C.F. of the differential equation $x^2 \dfrac{d^2y}{dx^2} + 4x\dfrac{dy}{dx} + 2y = e^x$ is

   a) $\dfrac{c_1x + c_2}{x^2}$ b) $\dfrac{c_1}{x} + \dfrac{c_2}{x^2}$ c) $c_1x + c_2x^2$ d) $c_1x + c_2$

7) If $1 + P + Q = 0$ then the solution of $\dfrac{d^2y}{dx^2} + P\dfrac{dy}{dx} + Qy = 0$ is

   a) $y = e^x$ b) $y = e^{-x}$ c) $y = e^{2x}$ d) $y = e^{-2x}$

8) If $P + Qx = 0$ then the solution of $\dfrac{d^2y}{dx^2} + P\dfrac{dy}{dx} + Qy = 0$ is

   a) $y = e^x$ b) $y = e^{-x}$ c) $y = -x$ d) $y = x$

9) The known solution of the differential equation

   $x^2 \dfrac{d^2y}{dx^2} - 3x\dfrac{dy}{dx} + 3y = x^2(2x - 1)$ is

   a) $u = x$ b) $u = 1$ c) $u = -1$ d) $u = -x$

10) The general solution of the equation $xdx + ydy + zdz = 0$ is

   a) $x + y + z = c$ b) $x - y - z = c$

   c) $x^2 + y^2 + z^2 = c$ d) $xyz = c$

11) The one solution of the equation $\dfrac{dx}{xz} = \dfrac{dy}{yz} = \dfrac{dz}{(x+y)^2}$ is

   a) $\log(x^2y^2) = \log c_1$ b) $\log(xy) = \log c_1$

   c) $\log(xyz) = \log c_1$ d) $\log(x/y) = \log c_1$

12) The one solution of the equation $\dfrac{dx}{mz - ny} = \dfrac{dy}{nx - lz} = \dfrac{dz}{ly - mx}$ is

   a) $ldx - mdy + ndz = 0$ b) $ldx + mdy - ndz = 0$

   c) $ldx + mdy + ndz = 0$ d) $ldx - mdy - ndz = 0$

13) The equation $yzdx + zxdy + xydz = 0$ is _____ the condition of integrability.

   a) Satisfied   b) Not satisfied   c) Not integrable   d) None of these

14) A differential equation of the type _____ is called total differential equation.

   a) $P + Q + R = 0$ b) $Pdx + Qdy - Rdz = 0$

   c) $Pdx - Qdy + Rdz = 0$ d) $Pdx + Qdy + Rdz = 0$

2. Attempt **any seven** of the following : **14**

1) Solve $x = y + a\log P$.

2) Solve $p^2(x^2 - a^2) - 2xyp + (y^2 + a^4) = 0$.

3) Define Clairaut's differential equation and explain the method of finding its general solution.

4) Solve $x^2 \dfrac{d^2y}{dx^2} + x\dfrac{dy}{dx} - 4y = x^2$.

5) Solve $\dfrac{d^2y}{dx^2} + \dfrac{2}{x}\dfrac{dy}{dx} - 16y = 0$.

6) Solve $\dfrac{d^2y}{dx^2} - \cot x \dfrac{dy}{dx} + (\sin^2 x)y = 0$.

7) Explain how to solve the simultaneous differential equation $\dfrac{dx}{P} = \dfrac{dy}{Q} = \dfrac{dz}{R}$ by the method of multipliers.

8) Solve $\dfrac{dx}{mz - ny} = \dfrac{dy}{nx - lz} = \dfrac{dz}{ly - mx}$.

9) Find the necessary condition for the integrability of the equation
$2xyz\,dx - z(x^2 + z)\,dy - y(x^2 + y)\,dz = 0$.

3. A) Attempt **any two** of the following : **10**

1) Solve $y = 2px + x^2p^4$.

2) Explain how to solve the equation

$$(a + bx)^n \dfrac{d^ny}{dx^n} + P_1(a + bx)^{n-1}\dfrac{d^{n-1}y}{dx^{n-1}} + \ldots + P_{n-1}(a + bx)\dfrac{dy}{dx} + P_n y = X \text{ is}$$

reducible to homogeneous linear equation.

3) Solve $\dfrac{d^2y}{dx^2} + 2x\dfrac{dy}{dx} + (x^2 - 8)y = x^2 e^{-x^2/2}$.

B) Explain the method of solving homogeneous linear differential equation **4**

$$x^n \frac{d^n y}{dx^n} + P_1 x^{n-1} \frac{d^{n-1} y}{dx^{n-1}} + P_2 x^{n-2} \frac{d^{n-2} y}{dx^{n-2}} + \ldots + P_{n-1} x \frac{dy}{dx} + P_n y = X \text{ by}$$

changing the independent variable x to z by using substitution $x = e^z$, where $P_1, P_2, \ldots, P_n$ are constants and X is a function of x.

4. Attempt **any two** of the following : **14**

1) Explain how to solve the equation $\frac{d^2 y}{dx^2} + P \frac{dy}{dx} + Qy = R$, where P, Q, R are

the function of x only by changing the dependent variable y to v.

2) Solve $\frac{dx}{x^2 - yz} = \frac{dy}{y^2 - zx} = \frac{dz}{z^2 - xy}$.

3) Solve $2xdx + 2ydy + (x^2 + y^2 + e^z)dz = 0$.

5. Attempt **any two** of the following : **14**

1) Explain how to solve the equation $\frac{d^2 y}{dx^2} + P \frac{dy}{dx} + Qy = R$, where P, Q, R are

the function of x only by changing the independent variable x to z.

2) Solve $(3x+2)^2 \frac{d^2 y}{dx^2} + 3(3x+2) \frac{dy}{dx} - 36y = x^2 + x + 1$.

3) State and prove the necessary condition of integrability of the differential equation Pdx + Qdy + Rdz = 0, where P, Q, R are the functions of x, y, z. Hence explain the method of solving this equation when the condition is satisfied.

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SLR-W – 142

B.Sc. (Part – II) (Semester – IV) (CGPA Pattern – New) Examination, 2016
BOTANY
Paper – V : Plant Physiology and Cytogenetics

Day and Date : Saturday, 30-4-2016   Total Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions carry **equal** marks.
              2) Question **1** is **compulsory**.
              3) **Draw** neat and labeled diagrams **wherever** necessary.
              4) Figure to the **right** indicate **full** marks.

1. Rewrite the following sentences, choosing the using correct answer :   **14**

    1) During the night, stomata are open in _____
       a) C3 Plants   b) C4 Plants
       c) C2 Plants   d) CAM Plants

    2) C3 Cycle is known as _____
       a) Calvin cycle   b) HSK pathway
       c) CAM Pathway   d) None of these

    3) The organ which supplies the organic substances for translocation is
       called _____
       a) Source   b) Sink
       c) Both a) and b)   d) None of these

    4) The healthy root nodules in leguminous plants are pink in colour due to the
       presence of _____
       a) R.B.C.   b) W.B.C.   c) Hemoglobin   d) Leg hemoglobin

    5) _____ element is called heart of chlorophylls
       a) Mg   b) Na   c) P   d) Cu

    6) Nitrogen fixation by free living micro organisms was discovered by _____
       scientists.
       a) Hatch   b) Slack
       c) Winogardsky   d) Emersom

7) In _____ Chromosome centromere is located at the centre.
   a) Metacentric
   b) Submetacentric
   c) Telocentric
   d) Acrocentric

8) The meiosis gives rise to _____ haploid cells.
   a) 2
   b) 3
   c) 4
   d) 5

9) The coupling and repulsion theory was proposed by _____
   a) Bateson and Punnets
   b) Punnets and Sutton
   c) Bateson and Sutton
   d) Morgan and Sutton

10) T. H. Morgan investigated _____ types of linkage.
    a) Two
    b) Three
    c) Four
    d) Eight

11) There are _____ kinds of crossing over in chromosomes.
    a) Two
    b) Four
    c) Three
    d) Eight

12) When crossing over take place at more than two places in the same chromosome pair then it is called as _____
    a) Single crossing over
    b) Double crossing over
    c) Multiple crossing over
    d) None of these

13) In chloroplast the pile of thylakoids forms _____
    a) Cristae
    b) Stroma
    c) Granum
    d) None of these

14) _____ pigment is directly involved in photo chemical reaction.
    a) Chlorophyll 'a'
    b) Chlorophyll 'b'
    c) Xanthophyll
    d) Neoxanthin

2. Attempt the **any seven** of the following question : **14**

   1) Define non symbiotic nitrogen fixation.

   2) What is phloem uploading ?

   3) Define dimorphic chloroplast.

   4) What is 'L' chromosome ?

   5) Describe Diplotene stage of meiosis – I.

   6) Define the linkage.

   7) Explain the terms source and sink.

   8) What is meant by terminalisation ?

3. A) Attempt **any two** of the following questions : **10**
      1) Differentiate between Calvin cycle and C4 cycle.
      2) Explain the process of phloem loading.
      3) Comment up on the organisms involved in nitrogen fixation.

   B) Give the significance of meiosis. **4**

4. Answer **any two** of the following questions : **14**

   1) Explain the Cyclic photophosphorylation.

   2) Explain Coupling and Repulsion hypothesis on linkage.

   3) Comment up on the nitrogen cycle.

5. Answer **any two** of the following questions : **14**

   1) Explain C4 pathway of photosynthesis.

   2) Comment up on the Stern and Votta's theory of crossing over.

   3) Describe the types of chromosomes.

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Seat
No.

B.Sc. – II (Semester – IV) Examination, 2016
(New-CGPA Pattern)
MATHEMATICS (Paper – VI)
Abstract Algebra – I

Day and Date : Monday, 2-5-2016　　　　　　　　　　　　Max. Marks : 70

Time : 10.30 a.m. to 1.00 p.m.

N.B. : 1) **All** questions carry **equal** marks.
　　　　　2) **All** questions are **compulsory**.
　　　　　3) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative of the following :　　　　　　　　**14**

　1) Alternating group is of order

　　a) $\left(\frac{n}{2}\right)!$　　　　b) $\frac{n!}{2}$　　　　c) n!　　　　d) None of these

　2) (Z, –) is not a group since it does not satisfy following property
　　a) Closed　　　b) Associative　　c) Identity　　d) Inverse

　3) The identity element in group (G, $*$) where $*$ is defined by

　　$a * b = a + b - 1 \ \forall a, b \in G$ is
　　a) 0　　　　b) 1　　　　c) – 1　　　　d) None of these

　4) A relation '~' on set S defined by $a \sim b, b \sim c \Rightarrow a \sim c \ \forall a, b, c \in s$ is called.
　　a) Reflexive　　　b) Symmetric　　c) Transitive　　d) None of these

　5) The g.c.d. of (10, 150)
　　a) 10　　　　b) 150　　　　c) 5　　　　d) None of these

　6) If ϕ is Euler phi function then ϕ (41) =
　　a) 40　　　　b) 42　　　　c) 41　　　　d) None of these

　7) The value of expression $[2] \odot [5]$ in Z_7 is
　　a) 3　　　　b) 2　　　　c) 5　　　　d) None of these

8) How many generators are there of Z_{10}?

   a) 4   b) 2   c) 3   d) None of these

9) The number of subgroups of the group Z_{20} is

   a) 6   b) 4   c) 3   d) None of these

10) If H and K are subgroups of a group G then HK is a subgroup of G iff

   a) HK = KH   b) HK = G   c) HK = H   d) None of these

11) A finite group of prime order is

   a) Cyclic   b) Non cyclic   c) Normal   d) None of these

12) The number of positive divisor of the integer – 101 is

   a) 6   b) 5   c) 2   d) None of these

13) Let $f : G \to G^1$ be a homomorphism then kerf = _____

   a) $\{x \in G / f(x) = e\}$ b) $\{x \in G / f(x) = e'\}$

   c) $\{x \in G / f(x) = x\}$ d) None of these

14) If N is normal subgroup of G then for a $\in$ G

   a) O [G(a)]/O [N(a)]   b) O [N(a)]/O(a)

   c) O [G(a)]/O(a)   d) None of these

2. Attempt **any seven** of the following :   **14**

   1) Define congruent modulo n.

   2) If a, b, c $\in$ G and ba = ca then show that b = c.

   3) Write multiplication Cayley table for $Z_5^{\#}$.

   4) If (G, $*$) is group then prove that identity of G is unique.

   5) Define subgroup.

   6) Define equivalence relation.

   7) If $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 4 & 3 & 2 \end{pmatrix}$ and $\beta = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 4 & 2 \end{pmatrix}$ in S_4 compute $\alpha^{-1}\beta$.

   8) Solve the equation (1, 2) x = (1 2 3) in S_3.

   9) Compute ([6]$\odot$ [2]) $\oplus$ ([5]$\odot$ [3]) in Z_7.

3. A) Attempt **any two** of the following : **10**

1) For permutation $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 1 & 4 & 5 & 6 & 2 \end{pmatrix}$ and $T = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 4 & 1 & 3 & 6 & 5 \end{pmatrix}$

compute $\sigma^2 T$ and $T^2 \sigma$.

2) Find G.C.D. and write its linear combination of the two given number (1001, 33).

3) Show that every homomorphic image of cyclic group is cyclic.

B) Prove that the set of integer G = {... –3, – 2, – 1, 0, 1, 2, 3, ...} is group with resp. to addition. **4**

4. Attempt **any two** of the following : **14**

1) Show that every quotient group of abelian group is abelian.

2) If $\theta : G \rightarrow H$ is homomorphic then $\ker \theta$ is subgroup of G.

3) If R is additive group of positive number. Prove that mapping $f : R \rightarrow R_t$ defined by $f(x) = \log x \ \forall x \in R$ is an isomorphism.

5. Attempt **any two** of the following : **14**

1) State and prove Cayley's theorem.

2) Show that every homomorphic image of group G is isomorphic some quotient group of G.

3) Show that intersection of two subgroup of group G is a subgroup of G.

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Seat No.

B.Sc. (Part – II) (Semester – IV) (New CGPA) Examination, 2016
BOTANY (Paper – VI)
Plant Diversity and Utilization

Day and Date : Monday, 2-5-2016   Max. Marks : 70

Time : 2.30 p.m. to 5.00 p.m.

Instructions :   i) **All** questions are **compulsory**.

ii) Draw a **neat** labelled diagram **wherever** necessary.

iii) Figures to the **right** indicate **full** marks.

iv) **All** questions carry **equal** marks.

1. Rewrite the correct answer from the given alternatives :   **(1×14=14)**

   1) Botanical name of tur is
      a) *Cajanus cajan*   b) *Cicer aerietinum*
      c) *Medicago sativa*   d) *Sesbania sesban*

   2) *Medicago sativa* originated from _____ Western Asia.
      a) East   b) West
      c) North   d) South

   3) *Cocos nucifera* belongs to the family
      a) Liliaceae   b) Palmae
      c) Malvaceae   d) Cucurbitaceae

   4) The *Withania somnifera* drug is obtained from
      a) rhizome   b) stem
      c) root   d) leaf

   5) _____ is an example of vegetable oil sources.
      a) Groundnut   b) Chick pea
      c) Red gram   d) Lucerne

   6) _____ *brasiliensis is* the botanical name of rubber.
      a) *Celosia*   b) *Hevea*
      c) *Cajanus*   d) *Medicago*

7) The English name of *Azadirachta indica* is
   a) teak   b) turmeric
   c) indigo   d) margosa

8) The dyes is obtained from the bark of
   a) Tectona sp.   b) Celosia sp.
   c) Curcuma sp.   d) Acasia sp.

9) Manjista belongs to the family
   a) Rubiaceae   b) Caesalpinaceae
   c) Mimosaceae   d) Fagaceae

10) *Acalypha* is an example of _____ plant.
    a) seasonal   b) binnial
    c) perennial   d) climber

11) *Opuntia* sp. belongs to the family
    a) Crassulaceae   b) Nyctaginaceae
    c) Cactaceae   d) Combretaceae

12) _____ is an example of cosmetic and perfumes.
    a) *Citronella*   b) Kutch
    c) Bryophyllum   d) Red gram

13) _____ *barbadense* is the botanical name of korpad.
    a) *Rosa*   b) *Aloe*
    c) *Jasmine*   d) *Citronella*

14) *Emblica officinales* belongs to the family
    a) Solanaceae   b) Zingiberaceae
    c) Acanthaceae   d) Euphorbiaceae

2. Answer **any seven** of the following :   **(7×2=14)**
   i) Define fodder legume.
   ii) Give the botanical name of Cotton and Coir.
   iii) Define vegetable oil.
   iv) Give the three uses of *Adhatoda vesica*.
   v) What is natural product ?
   vi) Define plant dyes.
   vii) Write the dyes obtained from Saffron and Palas.
   viii) Define Perennial plants.
   ix) Write the sources of Rose and Aloe.

3. A) Answer **any two** of the following : **(2×5=10)**

    i) Describe the cultural practice of Soyabean.

    ii) Explain the *Bougainvillea* as ornamental plant studied by you.

    iii) Describe the origin, morphology and uses of Coir.

  B) Describe the plant dyes obtained from Log wood and Kutch studied by you. **4**

4. Answer **any two** of the following : **(2×7=14)**

    i) Explain the Shevari as fodder legume studied by you.

    ii) Describe the *Syzygium arromaticum* as medicinal plant.

    iii) Explain the plant Rose as a perfumes and cosmetics plant studied by you.

5. Answer **any two** of the following : **(2×7=14)**

    i) Explain the *Hevea brasiliensis* rubber plant studied by you.

    ii) Describe the Neem as botanical pesticides.

    iii) Write the *Acalypha and Crossandra* climbers perennials plants studied by you.

_____

Seat
No.

B.Sc. II (Semester – IV) (New CGPA Pattern) Examination, 2016
GEOGRAPHY
Biogeography (Paper – V)

Day and Date : Tuesday, 3-5-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

N.B. : 1) **All** questions are **compulsory**.
      2) Draw **neat** maps and diagrams **wherever** necessary.
      3) Use of map stencil is **allowed**.

1. Choose and write a correct from given four alternative :   **14**

   1) The _____ grasslands best support the activity of livestock farming in
      the world.

      (Tropical, Temperate, Polar, Monsoonal)

   2) _____ island show distinct species of plant and animals.

      (Isolated, Connected, Linked, Grouped)

   3) Commercial lumbering is an important activity in _____ region.

      (Tropical, Temperate, Polar, Arid)

   4) Sanjay Gandhi national park is located in _____

      (Gohatti, Borivali, Chandrpur, Bandipur)

   5) _____ bank is famous for fishing.

      (Grand, Axis, Reserve, Oucrseas)

   6) Many Siberian birds visit India during winter and return back in summer,
      which is a type of migration.

      (Forceful, Rapid, Gradual, Seasonal)

   7) Jim Corbett national park is famous for _____

      (Indian bison, Tiger, Lion, Ahino)

P.T.O.

8) The first terrestrial _____ plants were evolved from the aquatic red brown algae in Silurian period.

   (Blue, Blue green, Green, Colourless)

9) Any element of our environment that man can utilize for his welfare is identified as a _____ resource.

   (Natural, Physical, Cultural, Artificial)

10) Coal and petroleum contribute _____ amount of the energy resource.

   (Minimum, Maximum, Fifty percent, Very low)

11) The whole _____ history of the earth is divided in to 5 Era.

   (Biological, Geological, Ecological, Political)

12) The air prevention and control of Pollution Act enforced in _____

   (1972, 1974, 1981, 1985)

13) The _____ helped to dispersal of animals and plants during the historical periods.

   (Air, Land bridge, Open sea, Islands)

14) The toxic chemicals used for crop protection disturb the _____

   (Environment, Soil, Water, Ecosystem)

2. Answer **any five** of the following : **15**

   1) Water pollution causes.

   2) Environmental hazards.

   3) Dispersal of plants.

   4) Importance of fossil fuels.

   5) What is the migration of animals ?

   6) Pre Cambrian era.

3. Answer **any three** of the following :   **15**

    1) Evolution of plants.

    2) Migration of animals.

    3) Use of animal resources.

    4) Causes of air pollution.

4. Answer **any three** of the following :   **15**

    1) Environmental protection laws.

    2) Importance of environment.

    3) Conservations of resources.

    4) Air pollution.

5. A) Answer **any one** of the following long answer questions :   **6**

    1) Explain the Darwin's theory.

    2) Seasonal migration.

   B) Answer **any one** of the following long answer questions :   **5**

    1) Environmental protection.

    2) Availability of organic resources.

_____

Seat No.

B.Sc. (Part – II) (Semester – IV) (New CGPA) Examination, 2016
PSYCHOLOGY
Cognitive Psychology (Paper – V)

Day and Date : Tuesday, 3-5-2016   Total Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Choose and write a correct answer of the following **four** alternatives.   **14**

   1) _____ is the process whereby we can select from among the many stimulus.

   A) Health   B) Attention   C) Self   D) Stress

   2) The ERP, TMS, PET and MRI studies have corroborated and extended information processing concept of _____

   A) Health   B) Attention   C) Self   D) Stress

   3) The _____ difference between disjunctive and conjunctive search is well captured by FIT.

   A) Cognitive   B) Social   C) Abnormal   D) Applied

   4) _____ guiding idea was that the contents of consciousness.

   A) Maslow   B) Wundt   C) Skinner   D) Adler

   5) The scientific _____ was developed primarily in William James.

   A) Psychology   B) Sociology   C) Economics   D) History

   6) Today the study of _____ activity is again respectable.

   A) Mental   B) Social   C) Objective   D) Happiness

   7) Behaviorism also failed to provide insights into the nature of _____

   A) Perception   B) Anxiety   C) Self   D) Depression

8) _____ theories specify ways in which stimuli lead to responses.

   A) Behaviorist   B) Functionalist   C) Evolutionary   D) Socialist

9) The _____ approach produced firm foundations for future studies.

   A) Functionalist   B) Behaviorist   C) Evolutionary   D) Socialist

10) _____ proposed by Darwin.

   A) Control   B) Evolutionary   C) Self   D) Mind

11) _____ activities are like computer programs is a leap.

   A) Mental   B) Social   C) Objective   D) Happiness

12) _____ favored the view that selection is made at an early stage of processing.

   A) Broadbent   B) Adler   C) Skinner   D) Maslow

13) The goal of _____ is to take in information about the world.

   A) Self   B) Perception   C) Evolution   D) Sense

14) _____ psychology can be undermined by structure-process-trade-offs.

   A) Cognitive   B) Social   C) Evolutionary   D) Abnormal

2. Answer the following (**any seven** out of ten) :   **14**

   1) Define attention.

   2) Who developed a method to examine how information is accessed in memory ?

   3) Who established first psychological laboratory ?

   4) Full form of MRI.

   5) Which theories are limited by facts about the brain ?

   6) Define cognition.

   7) Which method measures directly observable behavior ?

   8) How many method we can evaluate the correlation ?

   9) Define encoding.

   10) Who won the 2003 Noble Prize in Physiology for their roles in developing MRI ?

3. Short Notes (**any two** out of four) : **14**

　　1) Mind and the brain.

　　2) Mental process.

　　3) Mental Representation.

　　4) Top-Down and Bottom-Up Processing.

4. Answer the following (**any one**) : **14**

　　1) Explain the nature and roles of attention.

　　　　　　OR

　　2) Explain the correlation Neural Methods.

5. Discuss on the contents of consciousness. **14**

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Seat
No.

B.Sc. – II (Semester – IV) (New CGPA Pattern) Examination, 2016
ELECTRONICS (Paper – V)
Fundamentals of Operational Amplifier

Day and Date : Tuesday, 3-5-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

N.B. : 1) *All* questions are *compulsory*.
2) Draw the *neat* diagrams *wherever* necessary.
3) Figures to the *right* indicate *full* marks.
4) *Use* of log-table and calculator is *allowed*.

1. Select the correct alternative for the following :   **14**

   i) When the two input signals to a differential amplifier are equal in amplitude
      and in the same phase, the output is _____

      a) doubled   b) zero

      c) maximum   d) none of these

   ii) A differential amplifier can be used to amplify _____

      a) ac signals only   b) dc signals only

      c) both ac and dc signals   d) none of these

   iii) The input impedance of an ideal operational amplifier is _____

      a) 0   b) $10\,K\Omega$ c) infinity   d) none of these

   iv) In op-amp IC-741, I/P and O/P pins are _____

      a) 4, 7   b) 2, 6   c) 1, 5   d) 1, 6

   v) A differential amplifier has an A_d of 100 and an A_{cm} of 0.1. What is its CMRR
      in dB ?

      a) 1000 dB   b) 60 dB

      c) 30 dB   d) This is impossible to determine

   vi) A voltage follower has a _____

      a) high input impedance   b) low output impedance

      c) voltage gain of one   d) all of these

vii) An op-amp comparator that uses positive feedback is known as a _____
   a) zero crossing detector   b) schmitt trigger
   c) peak detector   d) voltage follower

viii) op-amp integrator can be used as _____ filter.
   a) low pass   b) high pass
   c) band pass   d) band stop

ix) In a voltage to current converter, the output current is not affected by _____
   a) the load resistance value
   b) the input voltage
   c) the resistance, R, across which the input voltage is present
   d) none of these

x) In an inverting amplifier the input and output voltages are _____
   a) in phase   b) 180° out of phase
   c) 360° out of phase   d) 90° out of phase

xi) A zero-crossing detector can be obtained using _____
   a) comparator   b) half wave rectifier
   c) voltage regulator   d) bridge rectifier

xii) As the feedback resistor value R is increased, frequency of astable multivibrator _____
   a) increases   b) remains same
   c) decreases   d) none of these

xiii) In phase shift oscillator, op-amp is used in _____
   a) voltage follower mode   b) differential mode
   c) non-inverting mode   d) inverting mode

xiv) The closed loop gain in a wien bridge oscillator is _____
   a) 29   b) 3   c) > 29   d) 13

2. Attempt **any seven** of the following :   **14**
   i) Draw the equivalent circuit of op-amp.
   ii) Compare open loop and closed loop configuration of op-amp.
   iii) Sketch the diagram of op-amp as adder.
   iv) Give any four applications of a comparator.
   v) Draw the diagram of sawtooth oscillator with the help of op-amp.

vi) Explain slew rate.

vii) What is the concept of virtual ground in op-amp ?

viii) What is the necessity of differential amplifier ?

ix) In case of op-amp define :

a) Input offset voltage

b) Input bias current.

3. A) Attempt **any two** of the following : **10**

i) Explain current to voltage converter using op-amp.

ii) Draw the circuit diagram for the differential amplifier with constant current biasing and explain constant current bias.

iii) Write a short note on precision half wave rectifier.

B) Design a Wienbridge oscillator using op-amp for a frequency of oscillation of 1 kHz. Given c = 0.1 µ F. **4**

4. Attempt **any two** of the following : **14**

i) Draw and explain the circuit diagram of differentiator by using op-amp. Derive the expression for output voltage.

ii) Draw the block diagram of operational amplifier and explain it in detail.

iii) With the help of a circuit diagram and associated waveforms describe the working of basic triangular square-wave generator using op-amp.

5. Attempt **any two** of the following : **14**

i) What is differential amplifier ? What are the different configurations of differential amplifier ? Explain emitter coupled differential amplifier.

ii) What is schmitt trigger ? Explain its transfer characteristics. Give the application of schmitt trigger as sine to square wave converter.

iii) Explain op-amp as monostable multivibrator and obtain expression for pulse width.

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SLR-W – 148

Seat No.	

B.Sc. – II (Semester – IV) (CGPA Pattern) Examination, 2016
GEOLOGY (Paper – V) (New)
Igneous Petrology

Day and Date : Tuesday, 3-5-2016　　　　　　　　　　Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) **Draw** neat diagrams **wherever** necessary.
　　　　　　　　3) Figures to the **right** indicate **full** marks.

1. Write a correct answer from the given **four** alternatives :　　　　**14**

　　1) Quartz is an essential mineral in _____ rocks.

　　　　a) Basic　　　　　　　　　　　b) Acid

　　　　c) Intermediate　　　　　　　　d) Ultrabasic

　　2) When a rock is made up entirely of crystals, its texture is described as _____

　　　　a) Holocrystalline　　　　　　　b) Holohyaline

　　　　c) Merocrystalline　　　　　　　d) Felsitic

　　3) Plagioclase felspar and matic minerals are present in almost equal amount in _____ rock.

　　　　a) Diorite　　　　　　　　　　　b) Syenite

　　　　c) Gabbro　　　　　　　　　　　d) Granite

　　4) The temperature region in which the generation of crystals is slow is called the _____ region.

　　　　a) Metastable　　　　　　　　　b) Labite

　　　　c) Unlabile　　　　　　　　　　d) None of these

　　5) The crystallization of a single pure mineral from a melt of its own composition is called _____ magma.

　　　　a) Binary　　　　　　　　　　　b) Unicomponent

　　　　c) Ternary　　　　　　　　　　　d) Multicomponent

6) _____ is a monomineralic rock.
   a) Dunite
   b) Granite
   c) Basalt
   d) Syenite

7) With release of pressure, the magmatic gases tend to migrate towards points of _____ pressure.
   a) High
   b) Very high
   c) Least
   d) Medium

8) Basalt rock is a _____ rock.
   a) Basic
   b) Intermediate
   c) Acidic
   d) Ultrabasic

9) Texture means the _____ of mineral grains in a rock.
   a) Size
   b) Shape
   c) Arrangement
   d) All of these

10) Heavy crystals formed during the early phase of crystallization of a magma have a tendency to sink down is called _____
    a) Fractional crystallization
    b) Liquid immiscibility
    c) Gravity settling
    d) None of these

11) The continuous and discontinuous reaction series studied by _____
    a) Kant
    b) N. L. Bowen
    c) Lapalace
    d) Wichert

12) The magma which is rich in Si, Na and K and poor in Ca, Mg, Fe is called _____ magma.
    a) Basic
    b) Acidic
    c) Intermediate
    d) Ultrabasic

13) Igneous rocks containing mineral grains of more or less equal size are said to be _____
    a) Inequigranular
    b) Equigranular
    c) Porphyritic
    d) Ophitic

14) Peridotite rock is a _____ rocks.
    a) Basic
    b) Ultrabasic
    c) Intermediate
    d) None of the above

2. Solve **any seven** of the following : **14**

   1) What is 'isotherm' in crystallization of Ternary magma ?

   2) Define differentiation process in magma.

   3) Name any four salic minerals.

   4) Composition and texture of syenite.

   5) What is ultrabasic igneous rocks ?

   6) Mineral composition and texture of Diorite.

   7) Mineral composition and texture of Gabbro.

   8) Formation of pumice rock.

   9) What is the difference between magma and lava ?

3. A) Attempt **any two** of the following : **10**
   1) Explain poikilitic texture.
   2) Explain directive texture.
   3) Explain reaction structure.

   B) Write short note on : **4**
   1) Describe xenolith formations.

4. Attempt **any two** of the following : **14**

   1) Explain differentiation process of crystallization.

   2) Explain assimilation process in magma.

   3) Explain formation of glass and crystals.

5. Attempt **any two** of the following : **14**

   1) Explain crystallization process of binary magma.

   2) Explain continuous and discontinuous reaction series in magma.

   3) Write tabular classification of igneous rocks.

Seat No.

B.Sc. – II (Semester – IV) (New CGPA) Examination, 2016
MICROBIOLOGY (Paper – V)
Immunology and Medical Microbiology

Day and Date : Tuesday, 3-5-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
                2) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences by selecting correct answers from given alternatives :   **14**

    1) Widal test is used for diagnosis of

       a) enteric fever   b) dengue fever

       c) urinary tract infection   d) candidiasis

    2) Dengue virus contains _____ as genome.

       a) SS RNA   b) DS RNA   c) DS DNA   d) SS DNA

    3) Pus is used as clinical sample for diagnosis of

       a) dengue fever

       b) urinary tract infections

       c) enteric fever

       d) staphylococcal wound infection

    4) Virus multiplication in animal cell is prevented by

       a) lysozyme   b) colicin   c) interferon   d) complement

    5) _____ cells form antibodies.

       a) Macrophages   b) Natural killer

       c) B lymphocyte   d) T lymphocytes

    6) Incomplete antigen is known as

       a) autoantigen   b) hapten

       c) immunogen   d) interferon

P.T.O.

7) The reaction between a insoluble antigen and antibody is known as

   a) precipitation   b) agglutination

   c) neutralization   d) complement fixation

8) Acid fast staining as microscopic method for diagnosis is used for

   a) enteric fever   b) dengue fever

   c) tuberculosis   d) candidiasis

9) Coagulases are produced by

   a) Staph. aureus   b) Candida albicans

   c) Proteus vulgaris   d) Salmonella typhi

10) Oral thrush is caused by

   a) Candida albicans   b) Staph. aureus

   c) Salmonella typhi   d) Proteus vulgaris

11) T cells are matured in

   a) bone marrow   b) thymus   c) lymph node   d) spleen

12) In antibody structure L chain is attached to H chain by

   a) hydrogen bond   b) disulfide bond

   c) carbon-oxygen bond   d) electrophilic bond

13) _____ immunoglobulin is the most abundant in body fluids.

   a) IgG   b) IgD   c) IgM   d) IgE

14) Platelet count is decreased during

   a) urinary tract infection   b) dengue fever

   c) enteric fever   d) candidiasis

2. Answer in short **any seven** of the following :   **14**

   1) What is immunodiffusion test ?

   2) Give differences between killed and live vaccines.

   3) What is heterophile antigen ? Give one example of it.

   4) List infections caused by Candida Albicans.

   5) What is coagulase ? Give its importance.

6) What is interferon ? Give its role in innate immunity.

7) What is phagocytosis ? Name steps involved in it.

8) Write physicochemical properties of IgE.

9) Write any four features of antigen antibody reactions.

3. A) Attempt **any two** of the following :　　　　　　　　　　　　**10**
   1) Inflammation
   2) Antigenicity
   3) Biochemical tests for diagnosis of diseases.

   B) What are bacterial toxins ? Give differences between exotoxins and endotoxins.　　**4**

4. Attempt **any two** of the following :　　　　　　　　　　　　**14**
   1) What are lymphoid organs ? Describe primary lymphoid organs in detail.

   2) Which are the types of antigen antibody reactions ? Describe complement fixation test in detail.

   3) Write in short about enteric fever.

5. Attempt **any two** of the following :　　　　　　　　　　　　**14**
   1) What is immune response ? Describe in detail about primary and secondary immune response.

   2) What is antigen ? Describe types of antigens in detail.

   3) What is defense ? Describe in detail about physico-chemical barriers as first line of defense.

_____

Seat No.

B.Sc. II (Semester – IV) (New CGPA Pattern) Examination, 2016
GEOGRAPHY (Paper – VI)
Agricultural Geography

Day and Date : Friday, 6-5-2016   Max. Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

N.B. : 1) **All** questions are **compulsory**.
            2) Draw **neat** maps and diagrams **wherever** necessary.
            3) Use of map stencil is **allowed**.

1. Choose and write a correct from given **four** alternative.   **14**

   1) _____ geography is the sub branch of economic geography.

      A) Political   B) Historical   C) Settlement   D) Agriculture

   2) According to _____ Agriculture geography deals with a comparative
      study of continent and countries agriculture.

      A) Hillman   B) Coppock   C) Symon   D) Mayer

   3) The word agriculture comes from a _____ term 'Agercultura'.

      A) German   B) French   C) Latin   D) American

   4) Climate is a _____ factor affecting agriculture.

      A) Physical   B) Economic   C) Social   D) Historical

   5) _____ is a economic factor affecting agriculture.

      A) Climate   B) Government Policies

      C) Capital   D) Soil

   6) Traditional method is a _____ factor affecting agriculture.

      A) Physical   B) Social   C) Economic   D) Political

   7) Shifting cultivation is called 'Ladang' in _____

      A) Vitenam   B) Indonesia   C) India   D) Africa

P.T.O.

8) H.Y.V. is related to _____

   A) Green Revolution   B) Novo Culture

   C) Precision farming   D) White Revolution

9) Mixed farming agriculture involves crops and _____

   A) Fruit   B) Pulses   C) Oil seeds   D) Livestock

10) One cattle requires _____ times more area than a sheep in general.

   A) 2   B) 5   C) 7   D) 9

11) India ranks _____ in the production of dairy products in the world.

   A) 1st B) 3rd C) 5th D) 7th

12) Large numbers of sheep are present in _____

   A) Turkey   B) Kazakstan   C) Myanmar   D) Pakistan

13) In India _____ is the founder of green revolution.

   A) Swami   B) Sharma   C) Swaminathan   D) Raman

14) pH value is related to _____

   A) Fertilizer   B) Photosynthesis

   C) Nutrition   D) Soil

2. Answer **any five** of the following :   **15**

   1) What is agriculture geography ?

   2) What is subsistence agriculture ?

   3) Name of any three produces of plantation agriculture.

   4) What is green revolution ?

   5) State any two problems of Indian agriculture.

   6) What is Biofertilizer ?

3. Answer **any three** of the following : **15**

   1) Discuss the significance of the agriculture geography.

   2) Describe the economic determinant of agriculture.

   3) Write a note on poultry farming.

   4) Explain any one of the modern techniques of agriculture.

4. Write **any three** of the following : **15**

   1) Explain the nature of agriculture geography.

   2) Write a note on green revolution in India.

   3) Give a brief account of mixed farming.

   4) Write a note on dairy farming.

5. A) Answer **any one** of the following long answer question. **6**

   1) Write a note on sheep and goat rearing.

   2) What are the types of agriculture explain any one of them.

   B) Answer **any one** of the following long answer question. **5**

   1) State the major problems of agriculture in India.

   2) What are the effects of chemical fertilizer ?

———————————

Seat No.

B.Sc. (Part – II) (Semester – IV) (New CGPA) Examination, 2016
PSYCHOLOGY (Paper – VI)
Positive Psychology

Day and Date : Friday, 6-5-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Choose and write a correct answer of the following four alternatives :   **14**

    1) Seligman's description of the _____ pillars of positive psychology.

    A) 2   B) 3   C) 4   D) 5

    2) The _____ life is focused on active involvement in activities and relationship with others.

    A) Meaningful   B) Cultural

    C) Engage   D) Pleasant

    3) _____ description of the three pillars of positive psychology.

    A) Parks   B) Seligman

    C) Singer   D) Rashid

    4) The _____ life reflects the emphasis in positive psychology on understanding the determinants of the happiness.

    A) Meaningful   B) Cultural

    C) Engage   D) Pleasant

    5) _____ is a positive effect.

    A) Anger   B) Fear

    C) Negative   D) Cheerfulness

    6) _____ developed broaden and build theory of positive emotions.

    A) Watson   B) Fredrickson

    C) Tellegen   D) Salovey

P.T.O.

7) _____ distinctions are important to the focus of Fredrickson's theory.

    A) 2   B) 3   C) 4   D) 5

8) _____ describes four ways of positive emotions.

    A) Watson   B) Fredrickson

    C) Tellegen   D) Salovey

9) _____ examined the cardiovascular consequences of the negative and positive emotions.

    A) Fredrickson   B) Skinner

    C) Tellegen   D) Maslow

10) Coping behaviors are often grouped into _____ general categories.

    A) 2   B) 3   C) 4   D) 5

11) _____ describes as personal concerns.

    A) Achievements   B) Motivations

    C) Goals   D) Ideas

12) _____ research on personal striving.

    A) Cantor   B) Emmons

    C) Career   D) Austin

13) Grouzet suggested the content of human goals across _____ cultures.

    A) 10   B) 11   C) 14   D) 15

14) _____ motives refer to the rewards approval praise or situational demands.

    A) Internal   B) External

    C) Identified   D) Interjected

2. Answer the following (**any seven**) :   **14**

   1) Define personal goals.

   2) Meaning of personal projects.

   3) How many goals included in personal goals across culture ?

   4) Define positive affect.

   5) Define resilience.

6) What is a positive emotion ?

7) Define positive psychology.

8) What is happiness ?

9) How many types of well being ?

3. A) Write the short note (**any two**) :   **10**

   1) Positive psychology

   2) Clinical perspectives of resilience

   3) Personal goals.

   B) Factors of social well-being.   **4**

4. Answer the following (**any two**) :   **14**

   1) Explain the areas of positive psychology.

   2) Explain the social resources.

   3) Explain the measuring personal goals.

5. Answer the following (**any two**) :   **14**

   1) Discuss on happiness and success in college.

   2) Explain the psychological resources.

   3) Describe psychology of well-being.

_____

Seat No.

B.Sc. (Semester – IV) (New – CGPA) Examination, 2016
Paper – VI : ELECTRONICS
Digital Techniques and Microprocessor

Day and Date : Friday, 6-5-2016   Max.Marks : 70
Time : 10.30 a.m. to 1.00 p.m.

Instructions : 1) **All** questions are **compulsory**.

2) Figures to the **right** indicate **full** marks.

3) **Use** of calculator is **permissible**.

4) Draw **neat** labeled diagram **whenever** necessary.

1. Choose the correct alternative and rewrite the sentence :   **14**

1) The memory chip has 13 bit address bus then its capacity is

 a) 12 KB   b) 8 KB   c) 16 KB   d) 32 KB

2) DAC 0808 has _____ bit digital inputs.

 a) 12   b) 10   c) 8   d) 9

3) _____ IC is called as line driver.

 a) 74244   b) 74245

 c) 74138   d) 74373

4) The memory access capacity of 8085 microprocessor is

 a) 8 KB   b) 32 KB   c) 16 KB   d) 64 KB

5) The width of accumulator is _____ bit wide in the 8085 processor.

 a) 12   b) 8   c) 2   d) 16

6) A data storage capacity of memory chip 2764 is

 a) $4K \times 8$ b) $8K \times 8$

 c) $12K \times 8$ d) $16K \times 8$

7) In R – 2R ladder network DAC, the input resistance for each input is

 a) R   b) 3R   c) 4R   d) 2R

8) _____ consist of number configurable logic blocks, programmable interconnections and I/O blocks.

a) PLA　　　　　　b) PAL　　　c) CPLD　　　d) FPGA

9) In I/O mapped I/O scheme 8085 will access _____ I/O ports.

a) 256　　　　　　　　　　b) 512

c) 65536　　　　　　　　　d) 128

10) _____ symbol is used to represent the start and stop of program in the flow chart.

a) Oval　　　　　　　　　　b) Diamond

c) Parallelogram　　　　　　d) Rectangle

11) RRC instruction is an example of _____ addressing mode.

a) Register　　　　　　　　b) Direct

c) Indirect　　　　　　　　　d) Implied

12) The maximum clock frequency for 8085 microprocessor is

a) 3 MHz　　　　　　　　　b) 6 MHz

c) 12 MHz　　　　　　　　　d) 2 MHz

13) _____ IC acts as address latch in 8085 based system.

a) 74245　　　　　　　　　　b) 74373

c) 74138　　　　　　　　　　d) 74244

14) _____ instruction is a machine control group of instruction.

a) CALL 2040　　b) HLT　　　c) CMA　　　d) RET

2. Attempt **any seven** of the following : **14**

1) Give the basic difference between SRAM and Flash memory.

2) Define accuracy and resolution for DAC.

3) Explain in brief the concept of programmable array logic.

4) Define T state and machine cycle.

5) State four instructions having indirect addressing mode of 8085 processor.

6) Write the role of ALE signal in the 8085 based system.

7) What happens when NOP instruction is executed ?

8) Enumerate the action with respect to status signals S_0 and S_1 of 8085 processor.

3. A) Attempt **any two** of the following : **10**

1) Explain in brief the concept of CPLD.

2) Compare I/O mapped I/O scheme with memory mapped I/O scheme.

3) Write the functions of the following pins :
   1) ALE
   2) $IO / \overline{M}$
   3) $\overline{WR}$
   4) $\overline{RD}$
   5) HOLD

B) Find out the analog output for 4 bit R - 2R ladder network DAC if 0 = 0 volt and 1 = 5 volt for digital input 1) 1110 and 2) 1010. **4**

4. Attempt **any two** of the following : **14**

i) What is Tri-State logic ? Explain working of 74245 trans-receiver.

ii) Write the salient features of 8085 processor. Explain register array in brief with suitable examples.

iii) What is instruction ? Classify instruction set according to the functional category with suitable examples.

5. Attempt **any two** of the following : **14**

i) Write assembly language program to XOR two 8 bit numbers stored at memory location 2051 and 2052 and put the 8 bit result at memory location 2053 with flow chart.

ii) Write a note on basic microprocessor based system design with bus architecture.

iii) Explain the working principle of R – 2R ladder network DAC.

_____

Seat No.

B.Sc. II (Semester – IV) Examination, 2016
(New CGPA)
GEOLOGY Paper – VI
Sedimentary and Metamorphic Petrology

Day and Date : Friday, 6-5-2016　　　　　　　　　　Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Figures to the **right** indicate **full** marks.
　　　　　　　　3) Draw **neat** labelled diagrams **wherever** necessary.

1. Choose and write correct answer from given alternatives.　　　　**14**

　　1) Kankar is _____ deposit.

　　　　a) carbonate　　　b) siliceous　　　c) argillaceous　　d) ferrugenous

　　2) Sandstones with rock fragments up to 25% are called _____

　　　　a) arkose　　　　b) grit　　　　　c) graywacke　　d) none of these

　　3) Which of the following shows non-foliated fabric ?

　　　　a) Marble　　　　b) Schist　　　　c) Slate　　　　d) Phyllite

　　4) The sedimentary rocks precipitated from solution within the basin of deposition
　　　　are called

　　　　a) breccia　　　　b) conglomerate　c) sharle　　　　d) limestone

　　5) The crushed, angular rock fragments formed in shear zones are represented
　　　　by _____

　　　　a) fault breccia　　　　　　　b) volcanic breccia

　　　　c) Sedimentary breccia　　　　d) conglomerate

　　6) Omphacite is representative mineral of _____ Facies.

　　　　a) zeolite　　　　b) greenschist　　c) eclogite　　　d) amphibolite

P.T.O.

7) The _____ represent shallow water zone, extending from land mass and merges in ocean.

   a) continental slope   b) continental shelf

   c) abyssal zone   d) none of these

8) The _____ facies rocks are formed at low temperature and low pressure conditions.

   a) amphibolites   b) granulite   c) eclogite   d) zeolite

9) The example of residual deposits is _____

   a) shale   b) conglomerate c) limestone   d) bauxite

10) Gneiss represents _____ foliated fabric.

    a) strongly   b) non   c) weakly   d) none of these

11) A tendency of metamorphic rock to split easily along thin, smooth planes is called_____

    a) slaty cleavage b) lamination   c) stratification d) none of these

12) The process of chemical alteration of a rock by hydrothermal and other fluids is _____

    a) anatexis   b) polymetamorphism

    c) metasomatism   d) pyrometamorphism

13) The sediments having size > 256 mm are called _____

    a) gravels   b) pebbles   c) silt   d) boulders

14) The process of differential, or partial, melting of rocks, in the forming of metamorphic rocks is _____

    a) retrograde metamorphism   b) polymetamorphism

    c) anatexis   d) metasomatism

2. Solve **any seven** of the following :   **14**

   i) What is Arkose ?

   ii) Describe deltaic environment of deposition.

   iii) Explain characters and formation of non-foliated fabric.

   iv) Write a short note on- Shale.

v) Give the names of rocks having strongly-foliated fabric.

vi) Define skarn deposits.

vii) Give different terms used to describe Grain size of sediments.

viii) What is Granulite ?

ix) Explain characters of Marble.

3. A) Attempt **any two** of the following :   **10**

   i) What are rudaceous deposits ? Add a note on conglomerate.

   ii) Define metamorphic facies. Describe eclogite facies.

   iii) Describe isotropic and anisotropic fabric of metamorphic rocks.

  B) Give the classification of sedimentary rocks on mineral composition.   **4**

4. Attempt **any two** of the following :   **14**

   i) Define metamorphic rocks. Explain the characters of Mylonite and Gneiss.

   ii) Explain the processes of formation of sedimentary rocks.

   iii) Describe in detail carbonate rocks.

5. Attempt **any two** of the following :   **14**

   i) Describe poly-metamorphism and retrograde metamorphism.

   ii) Describe laterite and bauxite.

   iii) Describe alluvial fans, braided and meandering rivers with respect to fluvial environment of deposition.

_____

Seat No.

B.Sc. – II (Semester – IV) (CGPA New) Examination, 2016
MICROBIOLOGY (Paper – VI)
Applied Microbiology – II

Day and Date : Friday, 6-5-2016   Max. Marks : 70
Time : 2.30 p.m. to 5.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
 2) Figures to **right** indicate **full** marks.
 3) Draw **neat** labelled diagrams **wherever** necessary.

1. Rewrite the following sentences by choosing correct option :   **14**

   i) Fermentation is a _____ process.
      a) physical   b) chemical
      c) physicochemical   d) biological

   ii) The screening of organisms also helps in _____ the unwanted organisms.
      a) enriching   b) discarding
      c) enumerating   d) selecting

   iii) The productive efficiency of organism is increased by
      a) isolation   b) enrichment
      c) screening   d) improvement

   iv) The layer of oil should be _____ cm depth while preserving the organism.
      a) 0.1   b) 1   c) 10   d) 100

   v) A vacuum is applied in the technique of _____ for preservation.
      a) Lyophilization   b) Nitrogen storage
      c) Soil culture   d) Subculture

   vi) The laboratory fermentors have maximum capacity of _____ litres.
      a) 5   b) 15   c) 10   d) 100

   vii) A sparger is a device of
      a) aeration   b) agitation
      c) cooling   d) sterilization

P.T.O.

viii) The high protein content of fermentation medium leads to problem of

    a) contamination   b) spilling

    c) foam   d) evaporation

ix) _____ is the main raw material used in commercial production of alcohol.

    a) molasses   b) WSL

    c) CSL   d) Fruit juice

x) _____ is the optimum pH for penicillin production.

    a) 6.0   b) 7.2   c) 7.5   d) 8.0

xi) The alcohol recovery is done by

    a) Precipitation   b) Distillation

    c) Filtration   d) Centrifugation

xii) _____ is an example of probiotic food.

    a) milk   b) cheese   c) yogurt   d) pickles

xiii) The temperature used for growing yeast as SCP is

    a) 10   b) 20   c) 30   d) 40

xiv) _____ is measured in turbidimetric assay.

    a) inhibition zone   b) stimulation zone

    c) turbidity   d) colour intensity

2. Answer **any seven** :   **14**

    i) What is fermentation ?

    ii) What is dual fermentation ?

    iii) Write ideal characteristics of production strain.

    iv) What is primary screening ?

    v) List minimum 4 products of fermentation.

    vi) Define median.

    vii) Describe device of aeration.

    viii) Write on antifoam agents.

    ix) What is batch fermentation ?

3. A) Answer **any two** of the following : **10**
    i) Describe surface and submerged culture methods.
    ii) Write on secondary screening.
    iii) Write an probiotics.

   B) Give an account of continuous fermentation. **4**

4. Answer **any two** : **14**
   i) Write on penicillin fermentation.

   ii) Give an account of turbidometric assay.

   iii) Write an fermentor design mentioning parts and their functions.

5. Answer **any two** : **14**
   i) Define mean, mode and give applications d-biostatistics.

   ii) Give an account of single cell protein.

   iii) Describe diffusion and enzymatic assay.

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Seat No.	

B.Sc. – III (Semester – V) (New) Examination, 2016
ENGLISH (Compulsory)
Break Through

Day and Date : Wednesday, 30-3-2016　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N. B. : 1) **All** questions are **compulsory**.
　　　　2) Figures to the **right** indicate **full** marks.

1. A) Choose the correct alternative : **6**

　　1) Which of the following statements about the average parson is not true ?
　　　a) He teaches deference to the merely rich
　　　b) He is the alley of the squire
　　　c) He teaches honesty and equality
　　　d) He is a hypocrite

　　2) According to G. B. Shaw, people get their opinions so largely from
　　　a) The meditation they do　　　b) The discussion they hold
　　　c) The rich people they meet　　d) The newspapers they read

　　3) One of the devices women writers resorted in order to conceal their identity was
　　　a) To sign their names as 'Pericles'
　　　b) To adopt a male name
　　　c) To adopt a false female name
　　　d) To sign their work as 'Anon'

　　4) Abraham Lincoln believes that the world can never forget
　　　a) what the brave men did at Gettysburg
　　　b) what the rich people did for the poor
　　　c) what he did for the American people
　　　d) what the government did for the capitalists

　　5) The flower mentioned in the poem "*Abou Ben Adhem*" is
　　　a) Rose　　　b) Lily　　　c) Jasmine　　　d) Lotus

　　6) The poem "O Captain! My Captain!" is
　　　a) a sonnet　　b) a lyric　　c) an elegy　　d) a ballad

P.T.O.

B) Rewrite the following sentences choosing the correct modal auxiliary from the brackets. **2**

1) _____ I park my car here ? (Will, Must, May, Would)

2) _____ I make a cup of coffee for you ? (Would, Must, Might, Shall)

C) Write the following sentences in indirect speech. **2**

1) Sachin said to me, "What is the price of this shirt?"

2) The doctor said us, "Don't eat fruits and vegetables without washing them."

2. Answer **any five** of the following questions in brief : **10**

1) How do the newspapers, according to G. B. Shaw, conspire to indoctrinate the masses into following the agenda of a few rich people ?

2) Why were Abraham Lincoln and the American people gathered at the battle field of Gettysburg ?

3) Why do so many women writers choose to remain anonymous ?

4) What are the immaterial conditions of life that hinder women's talents as writers ?

5) What did Abraham Lincoln expect from his people ?

6) What does G. B. Shaw say about religion ?

3. A) Answer **any two** of the following in brief : **6**

1) What is the theme of the poem *Abou Ben Adhem* ?

2) Why does the poet ask the Captain the rise up ?

3) Why the captain in the poem is also called the 'father' ?

B) Write short reports on **any two** of the following : **4**

1) The inaugural function of Literary Association of your college.

2) The Prime Minister's visit to China.

3) Your visit to a drought prone area in Marathwada.

4. Answer **any one** of the following : **10**

1) Prepare a presentation consisting of five charts or slides to promote a "Dish Washer" in the market.

2) Write a presentation on the topic "Corruption in Higher Education" using charts, transparencies or slides.

5. Write a transcript of group discussion on the topic "Assassinations of modern thinkers in Maharashtra." **10**

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SLR-W – 156

B.Sc. – III (Semester – V) (New) Examination, 2016
PHYSICS
Special Paper – IX : Mathematical Physics and Statistical Physics

Day and Date : Thursday, 31-3-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. :   I) **All** questions are **compulsory**.
  II) **Draw** diagram **wherever** necessary.
  III) Figures to the **right** indicate **full** marks.
  IV) **Use** of calculator is **allowed**.

1. Select correct alternatives from the following :   **10**

   I) The integration of vector along a curve is _____

      a) Volume integral   b) Curved integral

      c) Line integral   d) Surface integral

   II) In orthogonal curvilinear coordinate system, the coordinate surfaces are in general _____

      a) Plane   b) Curved   c) Circular   d) Spherical

   III) In Green's symmetrical theorem $\iiint\limits_{v} \left(\phi \, \nabla^2 \, \psi + \vec{\nabla} \, \phi \cdot \vec{\nabla} \, \psi \right) dv =$ _____

      a) $\iint\limits_{s} \left(\phi \, \vec{\nabla} \, \psi \right) \cdot d\vec{s}$ b) $\iint\limits_{s} \left(\psi \, \vec{\nabla} \, \phi \right) \cdot d\vec{s}$

      c) $\iint\limits_{s} \vec{v} \cdot \hat{n} \, ds$ d) $\iint\limits_{s} \vec{v} \cdot d\vec{l}$

   IV) In cylindrical coordinate system, there lies symmetry about _____

      a) Point   b) An axis   c) An plane   d) Curve

   V) For the distribution of most probable condition is _____

      a) $w = 0$ b) $\ln w = 0$ c) $\delta \ln w = 0$ d) $\delta \ln w \neq 0$

VI) Thermodynamic can not be applied to _____ ensemble.

   a) Micro

   b) Microcanonical

   c) Canonical

   d) Grand canonical

VII) The relation between v_{mp}, $\bar{v}$ and v_{rms} of the gas molecule in a system is

   _____

   a) $v_{rms} < \bar{v} < v_{mp}$

   b) $v_{rms} \leq \bar{v} \leq v_{mp}$

   c) $v_{mp} < \bar{v} < v_{rms}$

   d) $v_{mp} \leq \bar{v} \leq v_{rms}$

VIII) The Steafan's law is _____

   a) $E = \sigma T^4$

   b) $E = T^4$

   c) $E = h\gamma$

   d) $E = \dfrac{hc}{\lambda}$

IX) Fermi-Dirac statistics is applicable to _____

   a) Electrons

   b) Photons

   c) Molecules

   d) Particles

X) The Bose-Einstein's distribution law is given by the equation _____

   a) $n_i = \dfrac{g_i}{e^{\alpha}\, e^{ui/kT} + 1}$

   b) $n_i = \dfrac{g_i}{e^{\alpha}\, e^{ui/kT} - 1}$

   c) $n_i = \dfrac{g_i}{e^{\alpha}\, e^{ui/kT}}$

   d) $n_i = \dfrac{g_i}{e^{\alpha} + 1}$

2. Answer **any five** of the following : **10**

   i) Define volume integral.

   ii) What are accessible microstates ?

   iii) Define phase space.

   iv) Draw the Maxwell-Boltzmann energy distribution curve and distribution curve for molecular speeds.

   v) Define Fermi energy.

   vi) State Gauss divergence theorem for vector field.

3. A) Attempt **any two** of the following : **6**

    I) Compare the Maxwell-Boltzmann statistics, Bose-Einsteins statistics and Fermi-Dirac statistics.

    II) Explain concept of orthogonal curvilinear coordinates.

    III) What do you mean by an ensemble ? Define microcanonical and canonical ensemble.

  B) Show that surface integral of position vector is equal to three times the volume enclosed by the surface by using Gauss theorem

$$\iiint_v \left(\vec{\nabla} \cdot \vec{r} \right) dv = \iint_s \vec{r} \cdot ds = 3v$$. **4**

4. Answer **any two** of the following : **10**

    I) Derive an expression for Maxwell-Boltzmann distribution law.

    II) Explain the application of Fermi-Dirac distribution law to free electrons in the metal.

    III) Deduce the functional relationship between entropy and probability. Hence states the statistical definition of entropy.

5. Answer **any one** of the following : **10**

    I) Obtain an expression for divergence in orthogonal curvilinear coordinates and extend the expression in orthogonal curvilinear coordinates to Cartesian form.

    II) Describe the Lummer and Prinqsheim's experiment to study the energy distribution in the spectrum of black body radiation. What are the results of the experiment ?

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Seat
No.

B.Sc. III (Semester – V) (New) Examination, 2016
Special Paper – IX : CHEMISTRY
Physical Chemistry

Day and Date : Thursday, 31-3-2016　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

> **N.B.** : 1) **All** questions are **compulsory**.
> 　　　　2) Figures to the **right** indicate **full** marks.
> 　　　　3) **Neat** diagrams must be drawn **whenever** necessary.
> 　　　　4) **Use** of logarithmic table/scientific calculator is **allowed**.

1. Choose the most correct alternative from each of the following and rewrite the sentence : **10**

　1) How many phases are present in the system having mixture of N_2, H_2 and O_2 gases ?

　　a) one　　　　　b) two　　　　　c) three　　　　　d) zero

　2) For a system $S_M \rightleftharpoons S_L \rightleftharpoons S_V$　the degree of freedom is

　　a) one　　　　　b) zero　　　　　c) two　　　　　d) three

　3) An electrode at which reduction occurs is called

　　a) anode　　　　b) cathode　　　c) null electrode　　d) none of these

　4) When the temperature coefficient of cell is unity, the entropy change for cell reaction is equal to

　　a) $-nF$　　　　b) nF　　　　c) zero　　　　d) F

　5) The cell emf E cell is related to ΔG as $\Delta G =$

　　a) $+ n E° F$　　　b) $- n E° F$　　　c) $E° - T \left(\dfrac{dE}{dT} \right)_p$　　　d) none of these

　6) When free energy change is zero cell emf is

　　a) zero　　　　　b) one　　　　　c) two　　　　　d) three

7) The cell that converts chemical energy in to electrical energy is known as

   a) galvanic cell   b) electrolytic cell

   c) voltaic cell   d) both a and c

8) The rate of photochemical reaction depends on

   a) intensity of light   b) concentration

   c) temperature   d) none of these

9) Optical density is expressed as

   a) $\log T$ b) $\log \dfrac{I_o}{I_t}$ c) $\log \dfrac{I_t}{I_o}$ d) all of these

10) IC means

   a) internal conversion   b) internal cell

   c) internal concentration   d) all of these

2. Answer **any five** of the following.   **10**

1) Calculate the number of components, number of phases and degree of freedom of a liquid at its critical point.

2) What is condensed system ? Give the mathematical equation for reduced phase rule.

3) What is electrolytic cell ? Give examples.

4) What is electrochemical series ?

5) Mention four different types of electrodes.

6) Define Grotthus-Draper law and Lambert law of photochemistry.

3. A) Answer **any two** of the following.   **6**

1) Define molar extinction coefficient and absorbance. How they are related to each other ?

2) How will you represent ?

   a) negative electrode

   b) positive electrode

   c) complete cell.

3) Define the term number of components of the system and give one example.

B) Calculate the electrode potential of the following electrode at 298 K. **4**

$$Fe^{++}_{(a=1)}, Fe^{+++}_{(a=0.1)} | Pt$$
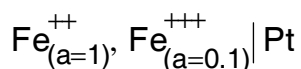
Given – $E^0_{Fe^{+++}/Fe^{++}} = 0.771$ volt .

4. Answer **any two** of the following. **10**

   1) Discuss the application of phase rule to lead-silver system.

   2) What are photochemical reactions ? How do they differ from the dark reactions ?

   3) Derive an expression for emf of an electrolyte concentration cell without transference.

5. Answer **any two** of the following. **10**

   1) Explain how emf measurements may be used to determine thermodynamic parameters $\Delta G, \Delta H$ and ΔS.

   2) What is quantum yield ? The quantum yield for the reaction $2HI \rightarrow H_2 + I_2$ is 2. Calculate the number of photons absorbed in an experiment in which 0.01 moles of HI are decomposed.

   (N = 6.023×10^{23})

   3) Calculate emf of the given cell, at 298 K

   $$Ag/Ag^{+}_{(a_1=0.1)} \| Zn^{++}_{(a_2=0.1)} | Zn$$
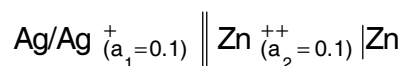
   Is the reaction is spontaneous ? Give reason.

   (Given : $E^0_{Ag} = 0.799$ volt and $E^0_{Zn} = -0.76$ volt)

   _____

SLR-W – 158

Seat No.	

B.Sc. III (Semester – V) (New) Examination, 2016
BOTANY (Special Paper – IX)
Biology of Cryptogams

Day and Date : Thursday, 31-3-2016　　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

*Instructions : 1) **All** questions are **compulsory**.*
*2) Draw neat labelled diagrams **wherever** necessary.*
*3) Figures to the **right** indicate **full** marks.*

1. Rewrite the following sentences by choosing correct answer from the given alternatives. **10**

　　i) Algae occurring in waters having high concentration of salinity are called as

　　　　a) Halophytes　　　　　　　　b) Lithophytes

　　　　c) Cryophytes　　　　　　　　d) Parasites

　　ii) The science that deals with the study of algae is called as

　　　　a) Mycology　　b) Phycology　　c) Bryology　　d) Cytology

　　iii) _____ belongs to class chlorophyceae.

　　　　a) Nostoc　　　　　　　　　　b) Ectocarpus

　　　　c) Chara　　　　　　　　　　d) Batrachospermum

　　iv) Powdery mildew of Teak is caused by _____ sp.

　　　　a) Polyporus　　b) Agaricus　　c) Penicillium　　d) Uncinula

　　v) _____ is a wood rotting fungus.

　　　　a) Polyporus　　b) Albugo　　c) Puccinia　　d) Cercospora

　　vi) Gemma bodies of Marchantia are concerned with _____ reproduction.

　　　　a) asexual　　b) vegetative　　c) sexual　　d) all the above

　　vii) Amphiploic siphonostele is found in

　　　　a) Psilotum　　b) Lycopodium　　c) Marsilea　　d) Marchantia

P.T.O.

viii) _____ is example of Parenchymatous forms of algae.

    a) <u>Nostoc</u>   b) <u>Chara</u>   c) <u>Vaucheria</u>   d) <u>Ulva</u>

ix) Stalk of a fruiting body of Mushroom is called

    a) Stipe   b) Gills   c) Umbrella   d) Collar

x) Antheridiophore is the stalk of male sex organ of

    a) <u>Riccia</u>   b) <u>Marchantia</u>   c) <u>Anthoceros</u>   d) Both a and c

2. Answer **any five** of the following.   **10**

   i) Give systematic position of <u>Ectocarpus</u>.

   ii) Define haplontic type of life cycle.

   iii) Sketch and label the structure of archegonium in <u>Marchantia</u>.

   iv) Define Life cycle of algae.

   v) Explain any one method of vegetative reproduction in fungi.

   vi) What is spawning ?

3. A) Answer **any two** of the following.   **6**

    i) Describe the filamentous forms of algae.

    ii) Describe the external morphology of <u>Marsilea</u>.

    iii) Give occurrence and structure of mycelium in <u>Polyporus</u>.

  B) Give economic importance of Mushrooms.   **4**

4. Answer **any two** of the following.   **10**

   i) Describe the sex organs of <u>Chara</u>.

   ii) Describe the sexual reproduction and structure of Cleistothecium in <u>Uncinula</u>.

   iii) Describe the structure of sporophyte in <u>Marchantia</u>.

5. Answer **any two** of the following.   **10**

   i) Describe the structure of sporocarp in <u>Marsilea</u>.

   ii) Describe the colonial forms of algae.

   iii) Describe the structure of basidiocarp in <u>polyporus</u> and add a note on its economic importance.

_____

Seat No.

B.Sc. – III (Semester – V) (New) Examination, 2016
ZOOLOGY
Special Paper – IX : Non-Chordates

Day and Date : Thursday, 31-3-2016
Time : 2.30 p.m. to 4.30 p.m.   Max. Marks : 50

Instructions : i) ***All*** questions are ***compulsory***.
　　　　　　　　ii) *Figures to the* ***right*** *indicates* ***full*** *marks.*
　　　　　　　　iii) *Draw* ***neat*** *labelled diagrams* ***wherever*** *necessary.*

1. Select appropriate answer from each of the following and rewrite the sentence : **10**

   1) In Sycon, water current enters in spongocoel cavity by _____ openings.
      a) Apopyle　　　　b) Prosopyle　　　　c) Gastric ostium　d) Dermal ostia

   2) In paramoecium, the fusion of two gametic nuclei originates by single nucleus called as
      a) Endomixis　　　b) Automixis　　　c) Hemixis　　　　d) Exogamy

   3) In coelenterata, the gonozooids are concerned with
      a) Protection　　　b) Absorption　　　c) Reproduction　d) Respiration

   4) Leech is _____ animal.
      a) Pseudoparasitic　　　　　　　b) Endoparasitic
      c) Ectoparasitic　　　　　　　　d) Ecto-endoparasitic

   5) In _____ type of insect metamorphosis the young immatured nymph or naiad is aquatic while its adult is terrestrial.
      a) Hemimetabolous　　　　　　　b) Ametabolous
      c) Holometabolous　　　　　　　d) Paurometabolous

   6) In sea star, the function of pedicillariae is
      a) Excretion　　　　　　　　　　b) Locomotion
      c) Capturing prey　　　　　　　　d) Capture and removal of debris

7) In Leech, temporary clitellum is developed by the segment number
   a) 14, 15, 16   b) 9, 10, 11   c) 20, 21, 22   d) 24, 25, 26

8) Sea stars are _____ in feeding habits.
   a) Herbivorous   b) Omnivorous   c) Carnivorous   d) Sanguivorous

9) In Lingula, _____ part acts as a gonoduct.
   a) Nephridium   b) Heart vesicle   c) Pedicel   d) Lophophore

10) Doliolaria larva belongs to the class
   a) Echinoidea   b) Holothuroidea   c) Asteroidea   d) Crinoidea

2. Answer **any five** of the following :   **10**
   i) Polypod larva.
   ii) Functions of suckers of Leech.
   iii) Aboral surface of sea star.
   iv) Define living fossil.
   v) Zoea larva.
   vi) Detortion.

3. A) Answer **any two** of the following :   **6**
        i) Describe binary fission in paramoecium.
        ii) Describe food and feeding mechanism in Leech.
        iii) Describe salient features of ctenophora.

   B) Describe locomotion in Leech.   **4**

4. Answer **any two** of the following :   **10**
   i) Describe affinities of peripatus.
   ii) What is canal system ? Describe main types of canal systems in porifera.
   iii) Describe structure of echinopluteus larva.

5. Answer **any one** of the following :   **10**
   i) Describe water-vascular system of sea star.
   ii) Describe excretory system of Leech.

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Seat
No.

B.Sc. – III (Semester – V) (New) Examination, 2016
MATHEMATICS (Special Paper – IX)
Algebra – II

Day and Date : Thursday, 31-3-2016   Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

N.B. : 1) **All** questions are **compulsory**.

     2) Figures to the right indicate **full** marks.

1. Choose the correct alternative of the following :   **10**

   1) The characteristic of the ring $Z_3 \times Z_4 =$

     a) 7   b) 12   c) { 0 }   d) 6

   2) The maximal ideal M in Z_{12} are

     a) 2   b) 5   c) 3   d) 4

   3) Which structure is not a field ?

     a) (R, +, .)   b) (C, +, .)   c) (E, +, .)   d) (Q, +, .)

   4) The vector space $M_{3\times4}(F)$ has dimension is

     a) 3   b) 4   c) 12   d) 7

   5) Over the field of real numbers, the vector space of complex numbers has dimension

     a) 1   b) 2   c) 3   d) 0

   6) The vector V_1, V_2, _____, V_n in a vector space V are said to be linearly independent if $\sum_{i=1}^{n} a_i V_i = 0$ implies.

     a) All $a_i = 0$ b) At least one $a_i \neq 0$

     c) All $a_i \neq 0$ d) None of these

   7) Let $T : V \rightarrow W$ is linear then null space N (T) of T is

     a) {x ∈ V/T (x) = 0}   b) {x ∈ V/T (x) = x}

     c) {x ∈ W/T (x) = 0}   d) {x ∈ W/T (x) = x}

8) T : $R^2 \to R^3$ be linear transformation defined by T (x, y) = (x + y, 0, 2x – 5y)

β and γ are standard ordered basis for R^2 and R^3 then $[T]_\beta^\gamma$ =

a) $\begin{bmatrix} 1 & 1 \\ 0 & 0 \\ 2 & -5 \end{bmatrix}$

b) $\begin{bmatrix} 1 & 0 & 2 \\ 1 & 0 & -5 \end{bmatrix}$

c) $\begin{bmatrix} 1 & 1 \\ 2 & -5 \end{bmatrix}$

d) $\begin{bmatrix} 1 & 2 & 0 \\ 1 & -5 & 0 \end{bmatrix}$

9) If x = (1 – i, 2 + 3i) and y = (2 + i, 3 – 2i) $\in C^2$. Then $\langle x, y \rangle$ =

a) –5 + 10i   b) –5 – 10i   c) 5 + 10i   d) 5 – 10i

10) If u = (2, 1, –1) $\in R^3$. Then $\dfrac{u}{\|u\|}$ =

a) $\dfrac{(2, 1, -1)}{\sqrt{5}}$ b) $\dfrac{(2, 1, -1)}{5}$ c) $\dfrac{(2, 1, -1)}{6}$ d) $\dfrac{(2, 1, -1)}{\sqrt{6}}$

2. Solve **any five** :   **10**

   1) Give an example of integral domain

   2) In any vector space 0u = 0

   3) Define ideal of a ring

   4) Evaluate $\| v \|$ where v = (3, 0, 4)

   5) Show that T (a_1, a_2) = (1, a_2) is not linear

   6) Prove that the set of diagonal matrices is a subspace of $M_{n \times n}$ (F).

3. Attempt **any two** :   **6**

   A) 1) Prove that intersection of two subspaces of a vector space is a subspace.

      2) Give an example which is left ideal but not a right ideal.

      3) Find the zero divisors of $(Z_6, \oplus, \odot)$.

   B) Prove that every finite integral domain is a field.   **4**

4. Attempt **any two** : 10

   1) Check whether ring of integers is an integral domain.

      Also, if a, b, c ∈ D, an integral domain such that a ≠ 0, then prove that ab = ac implies b = c.

   2) If f : R → S be a ring homomorphism then prove that

      a) The image of f is a subring of S

      b) The kernel of f is an ideal of R

   3) Find the basis of

      {(8, –12, 20), (7, 2, 0), (2, –3, 5), (1, 0, –2) (0, 2, –1)}

5. Attempt **any one** : 10

   1) State and prove fundamental homomorphism for rings.

   2) State and prove dimension theorem of vector spaces. Further for linear vector space T : V → W. T is one-to-one if and only if N (T) = 0.

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Seat
No.

B.Sc. (Part – III) (Semester – V) (New) Examination, 2016
STATISTICS
Statistical Inference – I (Special Paper No. – IX)

Day and Date : Thursday, 31-3-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. :   1) **All** questions are **compulsory** and carry **equal** marks.
       2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative :   **10**

   i) Estimate and estimator are

      a) Synonymous   b) Different

      c) Related to the population   d) None of these

   ii) If $x_1, x_2, ..., x_n$ is a random sample from an infinite population, then an unbiased estimator of the population variance σ^2 is

      a) $\displaystyle\sum_{i=1}^{n} x_i^2$ b) $\displaystyle\sum_{i=1}^{n} (x_i - \bar{x})^2$

      c) $\dfrac{1}{n} \displaystyle\sum_{i=1}^{n} (x_i - \bar{x})^2$ d) $\dfrac{1}{n-1} \displaystyle\sum_{i=1}^{n} (x_i - \bar{x})^2$

   iii) The denominator in the Cramer-Rao inequality is known as

      a) Lower bound for the variance   b) Information limit

      c) Upper bound for the variance   d) All the above

   iv) Mean squared error of an estimator T_n of $\phi(\theta)$ is minimum only if

      a) Bias and variance of T_n both are zero

      b) Bias is zero and variance is minimum

      c) Bias is minimum and variance of T_n is zero

      d) None of these

P.T.O.

v) If T_1 and T_2 are most efficient estimators with the same variance S^2 and the correlation between them is P, then the variance of $\left(\dfrac{T_1 + T_2}{2}\right)$ is

a) S^2 b) PS^2 c) $\dfrac{(1+P)S^2}{2}$ d) $(1+P)S^2$

vi) The concept of consistency, efficiency and sufficiency are due to

a) J.N. Neyman b) R.A. Fisher

c) C.R. Rao d) None of these

vii) Parameters are those constants which occurs in

a) Samples b) Probability density function

c) A formula d) None of these

viii) If T is sufficient for θ and an unique MLE $\hat{\theta}$ for θ exists, then

a) $\hat{\theta}$ is a function of T b) $\hat{\theta} = T$

c) $\hat{\theta}$ is independent of T d) None of these

ix) An estimator of a parametric function (θ) is said to be best, if it possesses

a) Any two properties of a good estimator

b) Any three properties of a good estimator

c) All the properties of good estimator

d) None of these

x) If the sample mean $(\overline{X})$ is an estimate of population mean (μ), then $(\overline{X})$ is

a) Unbiased and efficient

b) Unbiased and inefficient

c) Biased and efficient

d) None of these

2. Answer **any five** of the following : **10**

i) Suppose x_1 and x_2 is a random sample from $N(\mu, 1)$. If $T_1 = \left(\dfrac{x_1 + x_2}{2} \right)$ and

$T_2 = \left(\dfrac{x_1 + 2x_2}{3} \right)$. Find the efficiency of T_1 with respect to T_2.

ii) Obtain likelihood function if $x_1, x_2,...,x_n$ is a random sample from $N(\mu, \sigma^2)$.

iii) Define Minimum Variance Bound Unbiased Estimator (MVBUE) for a parameter.

iv) Define information function $I(\theta)$ of parameter θ.

v) State any two properties of maximum likelihood estimator (m.l.e.).

vi) What are the requirements of a good estimator ?

3. A) Answer **any two** of the following : **6**

   i) If T_n is a sequence of estimators such that

   $\left. \begin{array}{l} E(T_n) = \theta_n \to \theta \\ V(T_n) = \sigma^2_n \to 0 \end{array} \right\}$ as $n \to \infty$ then prove that T_n is consistent for θ.

   ii) Obtain Fisher Information dunction $I(\theta)$ based on a random sample $x_1, x_2,...,x_n$ from exponential distribution with p.d.f.

   $f(x, \theta) = \theta e^{-\theta x}; \ x \geq 0, \ \theta > 0$.

   iii) Obtain a sufficient statistic for the parameter (α, β) based on a random sample $x_1, x_2,...,x_n$ from a uniform distribution $U(\alpha, \beta)$.

   B) Explain the procedure of obtaining the estimates of the parameters by the method of moments. **4**

4. Answer **any two** of the following : **10**

   i) If $x_1, x_2,...,x_n$ is a random sample from, $f(x, \theta) = \theta e^{-\theta x}; \ x \geq 0, \ \theta > 0$. Show that $\overline{X}$ is MVBUE of $\dfrac{1}{\theta}$ and find its variance.

   ii) Find estimates of 'a' and 'b' by the method of moments.

   $f(x) = \begin{array}{ll} \dfrac{1}{b-a} & ; \quad a < x < b \\ = 0 & ; \quad \text{o.w.} \end{array}$

iii) Let $x_1, x_2,...,x_n$ be a random sample from $N(0, \sigma^2)$. Show that $\sum\limits_{i=1}^{n} \dfrac{x_i^2}{n}$ is an unbiased estimator of σ^2.

5. Answer **any two** of the following : **10**

i) Let $x_1, x_2,...,x_n$ be a random sample from $N(\mu, \sigma^2)$ population. Obtain maximum likelihood estimates for

i) μ when σ^2 is known

ii) σ^2 when μ is known

iii) Simultaneous estimation of μ and σ^2.

ii) Let $x_1, x_2,...,x_n$ be a random sample from $N(\mu, \sigma^2)$. Show that sample variance S^2 is a consistent estimator of σ^2.

iii) For a sample of size n from a normal population $N(\mu, \sigma^2)$, show that the estimator $\hat{\mu} = \dfrac{\sum\limits_{i=1}^{n} X_i}{n+1}$ is most efficient for estimating μ though it is biased.

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Seat
No.

B.Sc. III (Semester – V) Examination, 2016
MICROBIOLOGY (Special Paper – IX) (New)
Virology, Extremophiles and Bioinformatics

Day and Date : Thursday, 31-3-2016　　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. : 1) **All** questions are **compulsory**.

2) Figures to **right** indicate **full** marks.

1. Rewrite the sentences after choosing correct answer from the given alternatives. **10**

1) Microorganisms that are sometimes found growing in jellies, syrups and brines are known _____
   a) Acidophilic　　　b) Osmophiles　　c) Neutral　　　　d) Psychrophilic

2) One step Growth Experiment was deviced by _____
   a) Watson　　　　b) Crick　　　　c) Lederberg　　d) Delbruk

3) LHT system of viral classification grouped DNA viruses into _____ class.
   a) Retroviruses　　　　　　　　b) Deoxyvira
   c) Retroviridae　　　　　　　　d) Deoxyviridae

4) In _____ tissue cells do not invade surrounding tissues only remain localised as a compact mass.
   a) Benign tumors　　　　　　　b) Malignant tumors
   c) Malignant wart　　　　　　　d) Cancer

5) The BLAST programme is used in _____
   a) Biometry　　　　　　　　　b) Biostatistics
   c) Bioinformatics　　　　　　　d) Biotechnology

6) Rous Sarcoma virus causes _____ in mice.
   a) Breast Cancer　　b) Lymphoma　　c) Small pox　　d) Hepatitis

P.T.O.

7) _____ virus can undergo antigenic shift.
   a) Rabies   b) Hepatitis   c) Influenza   d) Pox

8) _____ is temperate phage.
   a) λ   b) T4   c) T3   d) θX174

9) _____ are electronic filing cabinets for vast amount of information.
   a) Database   b) Datamining   c) Annotation   d) Algorithm

10) Hubner and Todaro proposed _____ theory.
    a) Provirus   b) Proto virus
    c) Oncogene   d) Somatic mutation

2. Answer **any five** of the following :   **10**
   i) Explain contact inhibition phenomenon.
   ii) What is NCBI ?
   iii) Define malignant Warts.
   iv) Explain Commune phages.
   v) Define lysogeny.
   vi) Define Hyperthermophiles.
   vii) Write briefly on the genome of influenza virus.
   viii) Define burst size.

3. A) Answer **any two** of the following :   **6**
   1) Describe briefly methods used for enumeration of viruses.
   2) Briefly explain intracellular development of influenza virus.
   3) Describe briefly extremophilic microorganisms.

   B) Discuss in brief applications of Bioinformatics.   **4**

4. Answer **any two** of the following :   **10**
   1) Give the detailed account the LHT system of viral classification.
   2) Briefly explain lysogeny of lambda phage.
   3) Describe in detail cultivation of animal viruses.

5. Write short notes on **any two** of the following :   **10**
   1) Discuss in detail the reproduction of T4 Bacteriophages.
   2) Explain in detail oncogenesis.
   3) Briefly explain intracellular development of adenoviruses.

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Seat
No.

B.Sc. (Part – III) (Semester – V) Examination, 2016
ELECTRONICS (Special Paper – IX) (New)
Linear Integrated Circuits and Applications

Day and Date : Thursday, 31-3-2016　　　　　　　　　　　　　　Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Figures to the **right** indicate **full** marks.
　　　　　　　　3) Draw **neat** labelled diagram **wherever** necessary.
　　　　　　　　4) **Use** of log table and calculator is **allowed**.

1. Select the correct alternative for the following :　　　　　　　　**10**

　　i) Monolithic IC consists of
　　　a) Active components
　　　b) Passive components
　　　c) Both active and passive components
　　　d) None of the above

　　ii) A diffused resistor in an integrated circuit
　　　a) Can be any value
　　　b) Can be only of p-type
　　　c) Is formed at the same time as one of the transistor regions
　　　d) Is formed after the transistor diffusions

　　iii) A log amplifier has _____ in the feedback loop.
　　　a) a BJT　　　　　　　　　　b) a resistor
　　　c) a capacitor　　　　　　　　d) inductor

　　iv) In precision rectifier, op-amp is used to
　　　a) Reduce breakdown voltage　　b) Reduce cut-in voltage
　　　c) Increase cut-in voltage　　　　d) None of the above

v) A wide band-pass filter is formed by cascading
   a) Band-pass sections   b) Band-stop sections
   c) High pass and low pass sections d) All of the above

vi) A narrow band reject filter by using op-amp is commonly called as
   a) Notch filter   b) Passive filter
   c) State variable filter   d) None of these

vii) To have regulated positive D.C. voltage, we must use
   a) IC 78 XX series   b) IC 79 XX series
   c) IC 74 XX series   d) All of these

viii) A voltage regulator is a circuit which
   a) Maintains a constant d.c. output voltage inspite of the fluctuations in a.c. input voltage or load current
   b) Converts the a.c. voltage to d.c. voltage
   c) Smoothens the a.c. variations in d.c. output voltage
   d) None of the above

ix) PLL in normal condition is
   a) In capture mode   b) In lock range mode
   c) In free running mode   d) None of these

x) In case of PLL, the total capture range is $2 \Delta f_c =$

   a) $\sqrt{\Delta F_L f_1}$ b) $\Delta F_L f_1$

   c) $2 \Delta F_L f_1$ d) $2\sqrt{\Delta F_L f_1}$

2. Answer **any five** from the following :   **10**

   i) Write the basic chemical reaction in the epitaxial growth process of pure silicon.

   ii) What are the advantages of IC voltage regulators ?

   iii) Draw a circuit for a positive peak detector and its waveform for input and output.

   iv) What is difference between active filters and passive filters ?

   v) Define VCO.

   vi) Draw the circuit diagram of antilog amplifier.

3. A) Answer **any two** from the following : **6**
   i) Draw the block diagram of PLL. What is the function of phase detector ?
   ii) Explain variable voltage regulator using ICLM 317.
   iii) Draw the circuit diagram of second order high pass filter. Calculate the cut off frequency if $R_1 = R_2 = 2K\Omega$ and $C_1 = C_2 = 0.1\ \mu F$.

   B) Write a short note on sample and hold circuit by using op-amp. **4**

4. Answer **any two** from the following : **10**
   i) Explain LM 331 as voltage to frequency converter.
   ii) Explain the use of IC 565 as a frequency multiplier.
   iii) Explain second order butterworth low pass filter.

5. Answer **any one** from the following : **10**
   i) What is an integrated circuit ? Explain the steps involved in the fabrication of monolithic npn transistor.
   ii) Explain clipper and clamper by using op-amp.

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Seat No.

B.Sc. (Part – III) (Semester – V) (New) Examination, 2016
PHYSICS (Special Paper – X)
Solid State Physics

Day and Date : Friday, 1-4-2016 — Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) *Figures to the right indicate* **full** *marks*.
3) **Neat** *diagrams must be drawn* **wherever** *necessary.*
4) **Use** *of log table and calculator is* **allowed***.*

1. Select the correct alternatives : **10**

   i) Crystalline solids are _____ in nature.
   - a) Isotropic
   - b) Anisotropic
   - c) Superconducting
   - d) Magnetic

   ii) According to Wiedmann-Franz relation, $\dfrac{K}{\sigma}$ is proportional to
   - a) ρ
   - b) P
   - c) T
   - d) V

   iii) The boundary conditions for wave function of free electron in one dimensional potential well of length L are
   - a) $\psi(x) = 0$ at $x = 0$ and $x = L$
   - b) $\psi(x) = \infty$ at $x = 0$ and $x = L$
   - c) $\psi(x) = 0$ at $x < 0$ and $x > L$
   - d) None of these

   iv) If d_{nkl} is the interplaner distance of (nkl) plane then Bragg's diffraction condition for crystal will be
   - a) $2\, d_{nkl} \cos\theta = n\lambda$
   - b) $2\, d_{nkl} \sin\theta = n\lambda$
   - c) $4\, d_{nkl} \cos\theta = n\lambda$
   - d) $4\, d_{nkl} \sin\theta = n\lambda$

v) The effective mass of electron (m*) is given as

a) $m^* = \dfrac{\hbar^2}{\left(d^2E/dK^2\right)}$

b) $m^* = \dfrac{d^2E}{dK^2} \cdot \hbar^2$

c) $m^* = \dfrac{\hbar^2}{\left(d^2K/dE^2\right)}$

d) $m^* = \dfrac{h^2}{\left(d^2E/dK^2\right)}$

vi) The band gap energy of insulator is

   a) 0.7 V   b) 1 eV   c) 7 eV   d) 2.1 eV

vii) In case of Diamagnetics, magnetic susceptibility is

   a) Positive   b) Negative

   c) Some times positive   d) Some times negative

viii) Retentivity is observed in

   a) Ferromagnetic   b) Paramagnetic

   c) Diamagnetic   d) Anti-ferromagnetic

ix) Mixed state is observed in _____ superconductor.

   a) Type – I   b) Type – II

   c) Type – III   d) Type – I and Type – II

x) Curie law for paramagnetics, is stated as

a) $\chi = \dfrac{C}{T - Tc}$

b) $\chi = \dfrac{C}{T}$

c) $\chi = \dfrac{T - Tc}{C}$

d) $\chi = \dfrac{T}{C}$

2. Attempt **any five** of the following :   **10**

   i) What is superconductor ?

   ii) Define magnetic retentivity.

   iii) Define magnetic coercivity.

   iv) Define primitive cell.

   v) Define packing fraction.

   vi) State Bragg's law for X-ray diffraction.

3. A) Attempt **any two** of the following : **6**

   i) Explain Meissner effect.

   ii) Draw and explain hysteresis curve for ferromagnetic materials.

   iii) Draw the experimental arrangement and traces obtained in powder method of X-ray diffraction.

   B) The lattice constant of cubic lattice is $a = 2.5 \times 10^{-8}$ cm. Calculate d-spacing between (100), (110) and (111) planes. **4**

4. Attempt **any two** of the following : **10**

   i) Write short note on Type-I and Type-II superconductors.

   ii) Discuss any one property of the reciprocal lattice.

   iii) Calculate packing fraction of simple cubic structure.

5. Attempt **any one** of the following : **10**

   i) Describe Hall effect. Obtain the expression for mobility of charge carrier (μ) and conductivity (σ) of the metal.

   ii) Explain Sommerfield's theory to a free electron inside a potential well (one dimensional) and hence determine the expression for energy of nth state (E_n).

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Seat No.

B.Sc. (Part – III) (Semester – V) Examination, 2016
CHEMISTRY (New)
Special Paper – X : Inorganic Chemistry

Day and Date : Friday, 1-4-2016
Time : 2.30 p.m. to 4.30 p.m.

Max. Marks : 50

N. B. : 1) **All** questions are **compulsory**.
   2) **Draw** neat labeled diagram and give equations **wherever** necessary.
   3) Figures to the **right** indicate **full** marks.

1. Select the most correct alternative for the following and rewrite the sentences : **10**

   1) Magnitude of crystal field splitting energy Δ, depends up on
      a) oxidation state of metal   b) nature of ligand
      c) geometry of the complex   d) all of the above

   2) The according to VBT $[Ni(CN)_4]^{2-}$ is diamagnetic but actually it is _____ and proved by CFT and thus magnetic property correctly explained by CFT.
      a) Stable   b) Paramagnetic
      c) Low spin   d) Nonmagnetic

   3) CFSE for d^3 octahedral complex is _____ Dq.
      a) -4 b) -6 c) -8 d) -12

   4) In Fast Breeder Reactor _____ fuel is used.
      a) Thorium-232   b) Thorium-132
      c) Thorium-233   d) Radium-226

   5) For age determination by tracer technique _____ isotope is used.
      a) ^{17}O b) ^{14}C c) ^{12}C d) ^{15}N

   6) The _____ element is involved in blood clotting.
      a) Calcium   b) Cadmium   c) Iron   d) Zinc

   7) The phosphonitrilic compounds have general formula
      a) $(PNX_2)_n$ b) (PNX_2) c) $(PN_2X)_n$ d) $(P_4NX_2)_n$

   8) Black phosphorus contains _____ polymer backbone.
      a) P-N   b) P-P   c) P-O   d) C-P

P.T.O.

9) Solution of Gold nanoparticles shows various colours due to
   a) Different particle size   b) Different concentration
   c) Different inter atomic bonding   d) Different molecular conditions

10) The function of myoglobin is to
    a) Transport oxygen   b) Store oxygen
    c) Transport CO_2 d) All of these

2. Answer **any five** of the following :   **10**
   i) Give the importance of CFT for explaining properties of coordination complexes.
   ii) Distinguish between high spin and low spin complexes of Co(III) complexes.
   iii) Explain mechanism of esterification reactions with the help of tracer technique.
   iv) Define essential elements and trace elements with suitable examples.
   v) What are the uses of Inorganic polymers ?
   vi) Give the properties of nanoparticles.

3. A) Answer **any two** of the following :   **6**
   i) What is CFSE ? How will you calculate it for strong and weak field octahedral complex with d^4 configuration in terms of 10 Dq ?
   ii) Give the difference between Haemoglobin and Myoglobin.
   iii) Distinguish between organic polymer and inorganic polymer.

   B) What is nuclear reactions ? Explain projectile capture reactions.   **4**

4. Answer **any two** of the following :   **10**
   i) With the help of molecular orbital diagram explain magnetic properties of
   $\left[Co(NH_3)_6\right]^{3+}$.
   ii) What are the applications of tracer technique ? How this technique is important in analytical chemistry : Isotopic dilution method for determination of volume of blood ?
   iii) Describe in detail action of sodium – potassium pump.

5. Answer **any two** of the following :   **10**
   i) Discuss the crystal field splitting of d orbitals in square planer complex with suitable example.
   ii) What is Nuclear Reactor ? Explain the construction and working of FBR for generation of nuclear energy.
   iii) What are silicones ? Give their preparation properties and uses.

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Seat
No.

B.Sc. III (Semester – V) Examination, 2016
BOTANY (New)
Special Paper – X : Gymnosperms & Palaeobotany

Day and Date : Friday, 1-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. :   I) **All** questions are **compulsory**.
       II) **All** questions carry **equal** marks.
       III) Draw neat labelled diagrams **wherever** necessary.
       IV) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences choosing correct alternative :   **(1×10)**

   1) In Zamia the phyllotaxy of leaves is
      a) Simple   b) Dorsiventral
      c) Isobilateral   d) Pinnately compound

   2) _____ is a source of 'sago'.
      a) Gnetum   b) Zamia   c) Tuja   d) Pinus

   3) Gnetum has affinities with
      a) Angiosperms   b) Pteridophytes
      c) Bryophytes   d) Algae

   4) Young root of Gnetum has _____ xylem.
      a) Monarch and exarch   b) Monarch and endarch
      c) Diarch and exarch   d) Diarch and endarch

   5) Determination of age of fossils is known as
      a) Carbon dating   b) Sulpher dating
      c) Nitrogen dating   d) None of these

   6) _____ era is called age of cryptogams.
      a) Mesozoic   b) Cenozoic
      c) Palaeozoic   d) Precambrian

   7) _____ is a probably 1st vascular land plant.
      a) Cycadeoidea   b) Calamite
      c) Rhynia   d) Lepidodendron

8) Cellular details can be studied in _____ type of fossils.
   a) Impression
   b) Compression
   c) Petrification
   d) Cart

9) <u>Erigmocarpon</u> fossil fruit has _____ placentation.
   a) parietal
   b) axil
   c) marginal
   d) basal

10) Crude oil is a mixture of
   a) hydrocarbons
   b) proteins
   c) carbohydrates
   d) fats

2. Answer **any five** of the following :   **10**
   1) Give systematic position of <u>Gnetum</u>.
   2) Sketch and label sporophyte plant body of <u>Zamia</u>.
   3) What are fossils ?
   4) Define Form Genera.
   5) Define geological time scale.
   6) Enlist leaf generas of <u>Calamite</u>.

3. A) Answer **any two** of the following :   **6**
   1) Give Angiospermic affinities of <u>Gnetum</u>.
   2) Describe male cone of <u>Zamia</u>.
   3) Give classification of <u>Lyginopteris</u> with form genera.

   B) What is geological time scale ? Give fossil flora of Cenozoic era with climatic
   conditions.   **4**

4. Answer **any two** of the following :   **10**
   1) Describe v.s. of <u>Gnetum</u> ovule.
   2) What are fossils ? Describe any two types of fossils studied by you.
   3) Explain oil and coal are biotic in origin.

5. Answer **any two** of the following :   **10**
   1) Describe post fertilization changes in <u>Zamia</u>.
   2) Describe reproductive structures of <u>Lyginopteris</u>.
   3) What are microfossils ? Explain role of microfossils in oil exploration.

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Seat No.

B.Sc. (Part – III) (Semester – V) (New) Examination, 2016
ZOOLOGY (Special Paper – X)
Biostatistics, Bioinformatics, Medical Zoology and Evolutionary Genetics

Day and Date : Friday, 1-4-2016   Total Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. :   1) **All** questions are **compulsory**.
             2) Draw **neat** labelled diagrams **wherever** necessary.
             3) Figures to **right** indicate **full** marks.

1. Complete the sentence selecting appropriate answer :   **10**

   1) _____ is a device that is out of use in bioinformatics in present days.
      a) CD   b) Thumb drive   c) Floppy   d) Printer

   2) The disease malaria is caused by
      a) Plasmodium   b) Endameba   c) Vorticella   d) Euglena

   3) The larval stage of mosquito is
      a) Aquatic   b) Parasite   c) Aerial   d) Terrestrial

   4) In the perfect positive co-ordination the value of 'r' is
      a) – 1   b) 0   c) 0.5   d) + 1

   5) The pathogenic agent _____ is responsible for the disease Tuberculosis (TB).
      a) Polio virus   b) Bacterium   c) Plasmodium   d) Fungi

   6) The use of statistics in biological science is known as
      a) Bioinformatics   b) Biostatistics
      c) Biometry   d) Biotechnology

   7) Profuse salivation in dog bite man is due to
      a) Poliovirus   b) H_1V_1 virus c) Rabies   d) Antivirus

   8) Ctrl + V command used to _____ in computer used to.
      a) Paste   b) Delete
      c) Select   d) Save

   9) _____ is defined as systematic arrangement of data in rows and column.
      a) Ogive curve   b) Frequency distribution
      c) Tabulation   d) Co-relation

   10) Pen drive is _____ device in computer.
      a) Output   b) Input   c) Print   d) Corrupt

P.T.O.

2. Write short notes on following (**any five**) : **10**

   i) Student's 'T' test

   ii) Rabies virus

   iii) Proteomics

   iv) Hardy-Weinberg's law

   v) Elephantiasis

   vi) Classification.

3. A) Answer **any two** of the following : **6**

   i) Describe the pathogenicity and treatment of fasciolasis.

   ii) Write a note on importance on Bioinformatics.

   iii) Describe the disease Tuberculosis (TB).

  B) Write about the applications in search engines. **4**

4. Answer **any two** of the following : **10**

   i) Explain the Karl-Pearson's co-efficient co-relation.

   ii) Describe the frequency distribution in statistical table.

   iii) Give an account of polio virus and its pathogenicity.

5. Answer **any one** of the following : **10**

   i) Give an account of pathogenicity of Plasmodium and add a note on control.

   ii) Define median and calculate median from the following data :

No. of Students	08	06	04	15	07	08	09	01
Marks	32	26	36	55	42	76	87	66

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SLR-W – 170

B.Sc. III (Semester – V) (New) Examination, 2016
MATHEMATICS (Special Paper – X)
Complex Analysis

Day and Date : Friday, 1-4-2016   Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.

              2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative of the following :   **10**

   1) Consider the expansion $\sum\limits_{n=0}^{\infty} \dfrac{z^n}{3^n} + \sum\limits_{n=1}^{m} \dfrac{1}{z^n}$ for $|<|z|<3$ then z = 0 is

     a) an essential singularity   b) a pole of order one

     c) a point of analyticity   d) none of these

   2) A conjugate harmonic of u (x, y) = e^x siny is

     a) e^y cos x   b) e^x cos y

     c) $-e^x$ cos y   d) e^y/sin x

   3) The function f(z) = $\bar{z}$ = x − iy is

     a) analytic everywhere   b) analytic at origin

     c) not analytic for any Z∈D   d) none of these

   4) The analytic function whose real part is e^x cosy is

     a) e^z + ei   b) e^{2z}

     c) ze^{-z} d) none of these

   5) $\int\limits_L \bar{z}\, dz$ from z = 0 to z = 4 + 2i along the curve L defined by z = t^2+ it is

     a) $10 - \dfrac{8i}{3}$ b) $10 + \dfrac{8i}{3}$

     c) $8 + \dfrac{8i}{3}$ d) None of these

6) The series $\sum_{n=0}^{\infty} \dfrac{(-1)^n \; z^{2n}}{(2n)!}$ for $|z| < \infty$ represent

   a) sin z   b) cos z

   c) tan z   d) log (1+z)

7) The function $e^z / (z-1)^3$ has

   a) pole of order 2 at z = 1   b) pole of order 3 at z = 1

   c) simple pole   d) pole of order 2 at z = 0

8) $\operatorname*{Res}_{z=\alpha} f(z)$ where $\alpha = \dfrac{-a+\sqrt{a^2-b^2}}{b}, a > b > 0$ is

   a) $\dfrac{1}{z\sqrt{a^2-b^2}}$ b) $\dfrac{z}{\sqrt{a^2-b^2}}$

   c) $\dfrac{-1}{\sqrt{a^2-b^2}}$ d) $\dfrac{1}{\sqrt{a^2+b^2}}$

9) Residue of $\dfrac{1}{z(1-z^2)}$ at z = 0 is

   a) 1   b) $\dfrac{1}{2}$

   c) –1   d) 2

10) If $f(z) = \dfrac{e^z}{z^2(z^2+9)}$ Res f(z) at z = –3i is

   a) $\dfrac{e^{3i}}{54i}$ b) $\dfrac{e^{-3i}}{54i}$

   c) $\dfrac{ie^{3i}}{27}$ d) e^{3i}

2. Attempt **any five** of the following :   **10**

   1) Show that real part of an analytic function satisfy Laplace's equation.

   2) State Cauchy Riemann equation in polar form.

   3) Define rectifiable arc over the interval [a, b].

   4) State Laurent's series expansion theorem.

   5) Define residue at infinity.

   6) Evaluate the residues of $\dfrac{z^2}{(z-1)(z-2)(z-3)}$ at z = 1.

3. A) Attempt **any two** of the following : **6**

1) Show that u = x³ – 3xy² – 3x² – 3y² +1 is harmonic function and find the corresponding analytic function.

2) Expand $f(z) = \dfrac{1}{(z+1)(z+3)}$ in Laurent's series expansion valid for the region $|z| < 1$.

3) If C is an arc $\theta_1 \le \theta \le \theta_2$ of the circle $|z| = R$ and if $\lim\limits_{R \to \infty} z f(z) = A$ then show that $\lim\limits_{R \to \infty} \int\limits_c f(z)\,dz = i(\theta_2 - \theta_1)A$.

B) Explain Milne Thomson's method. **4**

4. Attempt **any two** of the following : **10**

1) Evaluate $\int\limits_0^{2\pi} \dfrac{d\theta}{a + b\sin\theta}$

2) Prove the Cauchy Riemann equation in polar form.

3) Obtain the Taylor and Laurent's series expansion which represents the function $\dfrac{z^2 - 1}{(z+2)(z+3)}$ in the region (i) $|z| < 2$ (ii) $2 < |z| < 3$

5. Attempt **any one** of the following : **10**

1) Integrate z² along the straight line OM and also along the path OLM consisting of two straight line segments OL and OM where O is origin, L is point z = 3 and M is pt. z = 3 + i. Hence show that $\int\limits_{OLMO} z^2\,dz = 0$

2) f(z) = P + i Q is analytic function of z = x + iy and $P - Q = -\dfrac{\cos x + \sin x - e^{-y}}{2\cos x - e^{y} - e^{-y}}$ find f(z) subject to condition f $(\pi/2)$ = 0.

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Seat
No.

B.Sc. – III (Semester – V) (New) Examination, 2016
STATISTICS
Sampling Techniques (Special Paper – X)

Day and Date : Friday, 1-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) **Soundless** calculators are **allowed**.

1. Choose most appropriate alternative from those given in **each** case :   **10**

   i) Probability of drawing a unit at each selection remains same in
      a) Srswor   b) Srswr
      c) Both a) and b)   d) None of a) and b)

   ii) Probability of including a specified unit in a sample of size n selected out of
       N units is

      a) $\dfrac{1}{n}$ b) $\dfrac{1}{N}$ c) $\dfrac{n}{N}$ d) $\dfrac{N}{n}$

   iii) The most important factor in determining the size of a sample is
       a) The availability of resources   b) Purpose of the survey
       c) Heterogeneity of population   d) None of the above

   iv) An estimator can possess
       a) A fixed value
       b) Any value
       c) Both a) and b)
       d) Neither a) nor b)

   v) Which of the following advantage of systematic sampling you approve ?
      a) Easy selection of sample
      b) Economical
      c) Spread of sample over the whole population
      d) All the above

vi) Selected units of a systematic sample are

    a) Not easily locatable

    b) Easily locatable

    c) Not representing the whole population

    d) All the above

vii) Circular systematic sampling was first used by

    a) W. G. Cochran   b) M. H. Hansen

    c) D. B. Lahiri   d) P. C. Mahalanobis

viii) There are more chances of non sampling errors than sampling errors in case of

    a) Studies of large samples   b) Complete enumeration

    c) Inefficient investigators   d) All the above

ix) A population is divided into clusters and it has been found that all items within a cluster are alike. Which of the following sampling procedures would you adopt ?

    a) Simple random sampling   b) Cluster sampling

    c) Systematic sampling   d) Stratified sampling

x) If n units are selected in a sample from N population units the sampling fraction is given as

    a) $\dfrac{N}{n}$ b) $\dfrac{1}{N}$ c) $\dfrac{1}{n}$ d) $\dfrac{n}{N}$

2. Attempt **any five** of the following :   **10**

    i) Define sampling frame. Give an example.

    ii) Find an expression for relative bias in the ratio estimate.

    iii) Give real life situations where systematic sampling is used.

    iv) Explain sampling errors.

    v) Distinguish between stratified sampling and cluster sampling.

    vi) Give the objectives of a sample survey.

3. A) Attempt **any two** of the following : **6**

   i) State the characteristics of a good questionnaire.

   ii) Explain proportional allocation and optimum allocation.

   iii) Find under what condition ratio estimate is more efficient than SRS.

  B) Explain sampling for proportion. Obtain its unbiased estimator for population proportion. **4**

4. Attempt **any two** of the following : **10**

   i) A population consists of 'N' clusters of M elements each. A sample of n clusters is drawn from it by method of SRS. Show that sample mean is unbiased estimator of population mean.

   ii) Find an unbiased estimator of the population mean and obtain its variance in case of stratified random sampling.

   iii) Write a note on two stage and multistage sampling.

5. Attempt **any one** of the following : **10**

   i) With usual notations prove that Neyman's allocation has better precision than proportional allocation which has better precision than simple random sample.

$$V(\bar{y}_n)_R \geq V(\bar{y}_{St})_P \geq V(\bar{y}_{St})_N.$$

   ii) In usual notations, show that :

     a) $E(\bar{y}_{lr}) \neq \bar{Y}$

     b) $V(\bar{y}_{lr}) = \dfrac{(N-n)}{Nn} S_y^2 (1-\rho)^2$

     where lr denotes linear regression.

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Seat No.	

B.Sc. – III (Semester – V) Examination, 2016
GEOLOGY (New) (Special Paper – X)
Geomorphology

Day and Date : Friday, 1-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) **Draw** neat labelled diagrams **wherever** necessary.

1. Fill in the blanks with correct answer from given options :   **10**

   1) Choose the incorrect statement about Himalayan rivers.
      a) Their tributaries are engaged in headward erosion
      b) Pot holes are normal features
      c) They are more sinous and develop numerous meanders
      d) Long profiles of rivers are characterised by rapids and water falls

   2) Stream lengthening is process carried by _____
      a) Erosion of Valley floor   b) Erosion of Valley sides
      c) Erosion at river mouth   d) Headward erosion

   3) Presence of sliken side is the proof of presence of _____ below the landscape.
      a) Fold   b) unconformity   c) Fault   d) None of these

   4) In the youth stage of river its valley sides show _____ slope.
      a) Convex   b) Rectilinear   c) Concave   d) None of these

   5) Waning slope is another name of _____ slope.
      a) Convex   b) Free face
      c) Rectilinear element   d) Concave element

   6) Which of the following is indicative of rejuvenation ?
      a) Ox-bow lake   b) Incised meanders
      c) Point bar   d) None of these

   7) "Present is the key to the past" is the principle of _____
      a) Uniformitarianism   b) Faunal succession
      c) Order of superposition   d) None

8) The landscape of Messa and Butte formed is formed by presence of _____ strata beneath.

a) Horizontal   b) Inclined   c) Folded   d) Faulted

9) As the river rejuvenate _____ starts in its downstream.

a) Valley widening   b) Deposition

c) Valley deepening   d) None of these

10) A high land between two streams is known as _____

a) Point bars   b) Spits   c) Subtracts   d) Divide

2. Answer **any five** of the following :   **10**

   i) What is peneplain ?

   ii) What is monocyclic landscape ?

   iii) What is absolute relief ?

   iv) At which stage of river potholes occur ?

   v) What are the causes of dynamic rejuvenation ?

   vi) Define landslides.

3. A) Answer **any two** of the following :   **6**

     i) What is anticlinal valley and synclinal ridges landscape ?

     ii) Define slope. Explain its importance in geomorphology.

     iii) What are transitional slides ?

   B) Write answer of **any one** :   **4**

   i) Explain how orientation of bedding plains affects mass movement.

   ii) Explain slow flowage and rapid flowage.

4. Answer **any two** of the following :   **10**

   i) Describe in brief three stages of cycle of erosion.

   ii) What is monitoring and control on mass movement ?

   iii) What causes subsidence ?

5. Answer **any two** of the following :   **10**

   i) What are characters of old stage in cycle of erosion ?

   ii) Describe elements of slope.

   iii) What are topographic evidences of rejuvenation ?

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Seat No.	

B.Sc. – III (Semester – V) (New) Examination, 2016
MICROBIOLOGY (Special Paper – X)
Industrial Microbiology

Day and Date : Friday, 1-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
   2) Figures to the **right** indicate **full** marks.
   3) Draw neat labelled diagrams **wherever** necessary.

1. Rewrite the sentences by selecting correct answer from given alternatives.   **10**

   1) Clearing of wine, development of aroma and flavour takes place during
      _____ process.
      a) aging   b) racking   c) packing   d) filtration

   2) _____ is used as cloning organism for production of rDNA products.
      a) B-subtilis   b) S.aureus   c) P.aeruginosa   d) E.Coli

   3) Insulin is
      a) Carbohydrate   b) Lipid
      c) Protein   d) Lipopolysaccharide

   4) In crystallization of citric acid filtered broth is treated with _____ to form
      calcium citrate.
      a) $CaCl_2$ b) $CaCO_3$ c) $CaSO_4$ d) $Ca(OH)_2$

   5) To convert N_2 gas (in nitrogen fixation) to ammonia _____ molecules of
      hydrogen are required.
      a) 3   b) 4   c) 6   d) 8

   6) _____ is produced by rDNA technology and which is antiviral in nature.
      a) Glycogen   b) Insulin   c) Interleukin   d) Interferon

   7) Woodruff and McDaniel medium is used for _____ fermentation.
      a) Streptomycin   b) Penicillin   c) Lysine   d) Biopolymer

8) For recovery and purification of heat sensitive products _____ is used.
   a) High speed cooling centrifuge
   b) Ultracentrifuge
   c) Lysophilizer
   d) Gel column

9) Wine storage tanks are generally constructed of
   a) Iron
   b) Nickel
   c) White Oak
   d) Red Oak

10) Incubation period for streptomycin production is _____ days.
   a) 1 to 2
   b) 5 to 7
   c) 15 to 20
   d) 8 to 10

2. Write short answers **any five** :   **10**
   a) List microorganisms used for lysine production.
   b) Types of beers.
   c) Define red table wine.
   d) What is curdling of milk ?
   e) Explain role of Hg haemoglobin.
   f) List media used in streptomycin production.
   g) What is solvent extraction ?

3. A) Write answers **any two** :   **6**
   a) Define screening, explain media used for screening.
   b) Write on centrifugation process.
   c) Write on fermented products curd and yogurt.

   B) Write in brief on biopesticides.   **4**

4. Write short notes **any two** :   **10**
   a) Spoilage of wines.
   b) Give role of maintenance and assay media.
   c) rDNA product insulin.

5. Write an essay on **any one** :   **10**
   a) Production and applications of Azofertilizer.
   b) Streptomycin fermentation.

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Seat No.

B.Sc. III (Semester – V) (New) Examination, 2016
ELECTRONICS
Fundamental of Communication (Special Paper – X)

Day and Date : Friday, 1-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** labelled diagrams **wherever** necessary.
4) **Use** of log-table and calculator is **allowed**.

1. Select the correct alternatives for the following :   **10**

   1) Two way communication system is also known as _____ system.
      a) Simplex   b) Duplex
      c) Complex   d) Multiplex

   2) The amplitude of an audiosignal is 10 V and that carrier is 50 V. Percentage of modulation index is
      a) 0.2%   b) 5%   c) 20%   d) 50%

   3) Line of sight communication is done by _____ wave.
      a) Ground   b) Sky
      c) Direct   d) Microwave

   4) Vertical scanning frequency for 625 line interlace scanning is
      a) 45 KHz   b) 45 Hz   c) 50 KHz   d) 50 Hz

   5) The lower existing layer in an ionosphere during day time is
      a) E-layer   b) D-layer
      c) F_1 layer   d) F_2 layer

   6) In T.V. aspect ratio is
      a) 9 : 16   b) 16 : 9   c) 5 : 4   d) 4 : 5

   7) In superhetro receiver of A.M. standard value of I.F. is
      a) 525 KHz   b) 625 KHz
      c) 455 KHz   d) None of these

P.T.O.

8) In PAL system number of lines are scanned for per frame

   a) 525   b) 625   c) 725   d) 825

9) Limitter circuit used in

   a) A.M. receiver   b) F.M. receiver   c) Both a) and b)   d) None of these

10) Number of tones in telephone are

   a) 1   b) 2   c) 3   d) 0

2. Answer **any five** of the following :   **10**

  i) Define noise figure.

  ii) Define modulation index in A.M.

  iii) Define skip-distance.

  iv) Draw block diagram of F.M. Receiver.

  v) Draw circuit diagram of envelop detector.

  vi) State the principle of telephone system.

3. A) Answer **any two** of the following :   **6**

    i) Explain ground ware propagation.

    ii) Explain principle of antenna.

    iii) Explain ratio detector.

  B) A sinusoidal carrier voltage of frequency 1200 KHz is amplitude modulated by a sinusoidal voltage of frequency 20 KHz, resulting maximum and minimum modulated carrier amplitude of 110 volt and 90 volt respectively.   **4**

  Calculate 1) Frequency of L.S.B. and U.S.B.

               2) Modulation index and amplitude of L.S.B. and U.S.B.

4. Answer **any two** of the following :   **10**

  i) Distinguish between A.M. and F.M.

  ii) Explain with block diagram electronics telephone exchange.

  iii) Explain interlace scanning.

5. Answer **any one** :   **10**

  i) Define amplitude modulation. Obtain the expression for A.M. modulated wave voltage.

  ii) Explain antenna parameters needed to establish half wave dipole antenna.

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B.Sc. III (Semester – V) (New) Examination, 2016
PHYSICS (Special Paper – XI)
Classical Mechanics

Day and Date : Saturday, 2-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) **Neat** diagrams must be drawn **wherever** necessary.
4) **Use** of log table or scientific calculator is **allowed**.

1. Select correct alternative.   **10**

    i) The transit time of a particle from a higher point to a lower point under the influence of gravity is a _____ along a cycloid passing through the two points.

       a) maximum   b) minimum   c) moderate   d) extremum

    ii) If T and T_0 are time of flight of projectile in resistive medium and non-resistive medium respectively then the correct relation between T & T_0 is

       a) $T < T_0$ b) $T = T_0$ c) $T > T_0$ d) $T \cong T_0$

    iii) The number of degrees of freedom for a simple pendulum is _____

       a) zero   b) one   c) two   d) three

    iv) The most general displacement of the rigid body is _____ plus _____ about some axis.

       a) translation, rotation   b) translation, vibration

       c) vibration, rotation   d) vibration, spin

    v) A particle is at rest in a rotating frame. The pseudo force acting on the particle in the rotating frame is _____

       a) zero   b) only the centrifugal force

       c) only the coriolis force   d) both b and c

vi) If all forces of a system are generated from a single function, the system is called _____ system.

   a) conservative
   b) non-conservative
   c) monogenic
   d) multigenic

vii) If the total force acting on a particle or system of particles is zero, then _____ of the particle or system of particles is conserved.

   a) angular momentum
   b) linear momentum
   c) energy
   d) torque

viii) The antisymmetric mode has _____ frequency than that of symmetric mode.

   a) lower   b) higher   c) much smaller   d) same

ix) For a freely falling body the effect of Coriolis force is _____

   a) to decrease its velocity
   b) to increase its velocity
   c) to stop its motion
   d) to produce horizontal shift

x) The energy transfer from an oscillator to its coupled partner is periodic and takes place with period _____

   a) $T = \dfrac{\pi}{\omega_1 - \omega_2}$
   b) $T = \dfrac{2\pi}{\omega_1 - \omega_2}$
   c) $T = \dfrac{4\pi}{\omega_1 - \omega_2}$
   d) $T = \dfrac{6\pi}{\omega_1 - \omega_2}$

2. Attempt **any five**.   **10**

   i) What is a pseudo force ? Give its example.

   ii) State Euler's theorem.

   iii) State Hamilton's principle.

   iv) State conservation theorem for angular momentum of system of particles.

   v) What is coupled system ? Give the meaning of term coupling.

   vi) State principle of virtual work.

3. A) Attempt **any two**.   **6**

   i) Explain the concept of centre of mass.

   ii) Explain the formation of cyclones.

   iii) What is constraint ? Give two examples of holonomic and non-holonomic constraints each.

   B) State and prove the theorem of energy conservation of a particle.   **4**

4. Attempt **any two**. 10

   i) Obtain the operator for a particle in a fixed and rotating coordinate systems and show that angular acceleration of a particle is the same in both coordinate systems.

   ii) Show that the shortest distance between any two points in a plane is along a straight line.

   iii) Derive an expression for the total energy of a system of two coupled pendulums in terms of normal coordinates.

5. Attempt **any one**. 10

   i) Obtain an expression for Lagrange's equation from D'Alembert's principle. Derive equation for Atwood's machine.

   ii) Derive the Euler's equations of motion of a rigid body. Show that the rate at which the work done by the torque is equal to the rate of change of kinetic energy of the body.

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Seat
No.

B.Sc. (Part – III) (Semester – V) (New) Examination, 2016
CHEMISTRY
Organic Chemistry (Special Paper – XI)

Day and Date : Saturday, 2-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** labelled diagrams **wherever** necessary.
4) **Use** of spectroscopic table provided by University is **allowed**.

1. Select the correct alternative from the given below and rewrite the answer :   **10**

   i) Methane gives _____ fundamental modes of vibrations in its IR spectrum.
      a) 10   b) 9   c) 5   d) 6

   ii) _____ spectroscopy is used for identification of functional groups.
      a) NMR   b) Mass   c) IR   d) None of the above

   iii) The type of radiations used in mass spectroscopy is
      a) Radio   b) IR   c) MW   d) Electron beam

   iv) Acetylenic protons are deshielded due to
      a) electronegative nature of acetylenic carbons
      b) higher bond order of the triple bond
      c) magnetic anisotropy
      d) intermolecular hydrogen bonding

   v) Diethyl malonate is an ester of
      a) acetic acid   b) acetone   c) aceto acetic acid d)   malonic acid

   vi) 4-methyl uracil is obtained from EAA by condensing it with
      a) Ammonia   b) Phenyl hydrazine
      c) Urea   d) Hydrazine

   vii) The deviation from normal tetrahedral angle for cyclopentane is
      a) 49° 28′   b) 19° 28′   c) 10° 32′   d) 1° 28′

   viii) Rings free from angle strain are called as _____ rings.
      a) strained   b) strainless   c) planner   d) large

P.T.O.

ix) Suggest reagent in the following reaction.
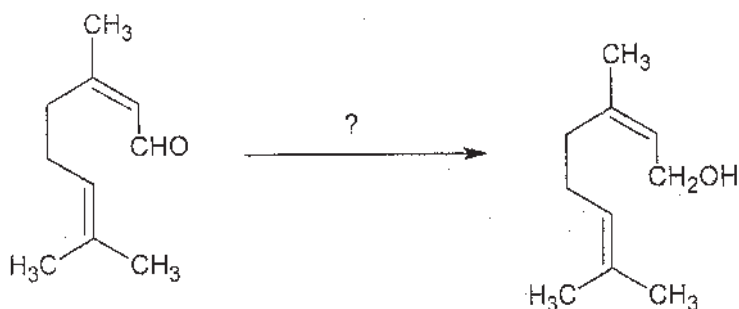
- a) Aluminium t-butoxide
- b) H₂/Pd-C
- c) Wittig reagent
- d) Aluminiumisopropoxide

x) Urea on reaction with alkainehypobromite produces hydrazine. Name the reaction.

- a) Wittig reaction
- b) Wagner – Meerwein rearrangement
- c) Hoffman rearrangement
- d) Knoevanagel reaction

2. Attempt **any five** of the following : **10**

i) What are shielded and deshielded protons ? Explain with examples.

ii) Suggest mechanism for the following reaction.
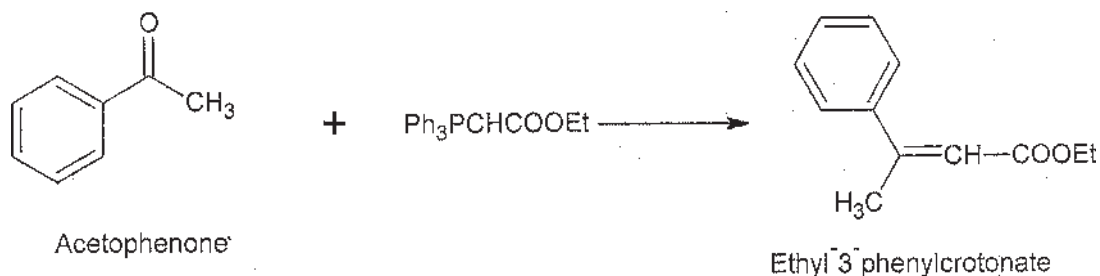
iii) Hoffman rearrangement can be used for the preparation of amines which are otherwise difficult to prepare. Explain.

iv) Explain the following observation.
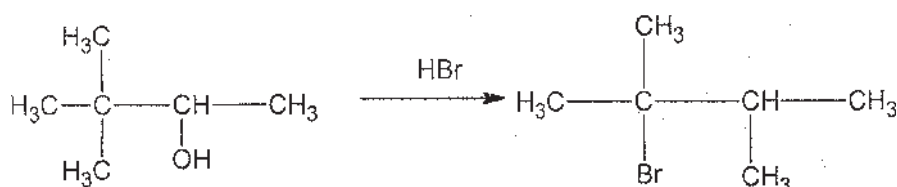
v) What do you mean by axial and equatorial bonds ?

vi) Triethyl amine shows only two signals in its NMR spectrum. Explain.

3. A) Attempt **any two** of the following : **6**

i) Explain the applications of mass spectroscopy.

ii) Equatorial cyclohexyl alcohol is more stable than axial cyclohexyl alcohol. Explain.

iii) Complete the following reactions.

a)

$$H_3C-\overset{\overset{\displaystyle O}{\|}}{C}-CH_2-\overset{\overset{\displaystyle O}{\|}}{C}-O-C_2H_5 \xrightarrow[POCl_3]{Urea} \ ?$$

b)

$$H_2C\begin{array}{l} \diagup COOC_2H_5 \\ \diagdown COOC_2H_5 \end{array} \xrightarrow[\text{ii.ClCH}_2COOC_2H_5]{\text{i.NaOEt}} \ ?$$

c)

$$H_2C\begin{array}{l} \diagup COOC_2H_5 \\ \diagdown COOC_2H_5 \end{array} \xrightarrow[\text{ii.HCl, H}_2O]{\text{i.KOH, heat}} \ ?$$
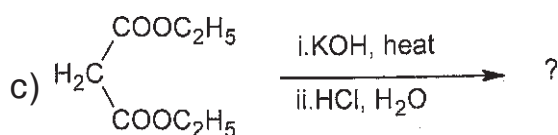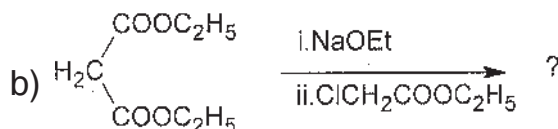
B) What do you mean by active methylene compound ? Give synthesis of Diethyl malonate. **4**

4. Attempt **any two** of the following : **10**

A) Assign structure to the molecule having following spectral data.

M.F. : C_4H_8O

m/e : 72

IR : 1720 cm^{-1}

NMR : triplet, 1.05 δ (3H)

singlet, 1.10 δ (3H)

quartet, 2.50 δ (2H)

B) $A(C_9H_8O)$ is an unsaturated compound showing positive silver mirror test. It decolourizes bromine water. On heating with aluminium isopropoxide in the presence of compound B (C_3H_8O) a secondary alcohol, it forms an hydroxyl compound $C(C_9H_{10}O)$. During the progress of reaction compound $D(C_3H_6O)$ is continuously distilled out. Identify A, B and C and D. Name the reaction.

C) State its limitations of Bayer's strain theory and discuss the theory of strainless rings.

5. Attempt **any two** of the following : **10**

A) Draw all possible conformations of cyclohexane. Explain, the stability order of different conformations of cyclohexane. Draw energy profile diagram.

B) Discuss the Stobbe condensation with the help of suitable example.

C) Write a short note on Wagner-Meerwein rearrangement.

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Seat No.

B.Sc. – III (Semester – V) (New) Examination, 2016
BOTANY
Genetics (Special Paper – XI)

Day and Date : Saturday, 2-4-2016　　　　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions: i) **All** questions are **compulsory**.
　　　　　　　　 ii) **All** questions carry **equal** marks.
　　　　　　　　 iii) Draw a **neat** labeled diagram **wherever** necessary.
　　　　　　　　 iv) Figures to the **right** indicate **full** marks.

1. Choose correct answer from given alternatives.　　　　　　　　**10**

　　1) Genes located on same locus but shows more than two different phenotypes are called
　　　　a) Multiple alleles　　　　　　　b) Polygenes
　　　　c) Codominant genes　　　　　　d) Pseudoalleles

　　2) The mechanism of sex determination in *Drosophila* was studied by _____ in 1921.
　　　　a) C.B. Bridge　　　　　　　　　b) Sturn and Hotta
　　　　c) Turner　　　　　　　　　　　d) Johansen

　　3) The self incompatibility was firstly reported by _____ in *Nicotiana tabacum* plant.
　　　　a) T.H. Morgan　　b) E.M. East　　c) G. Mendel　　d) W. Bateson

　　4) _____ type of antigen is present in blood group A
　　　　a) A　　　　　　b) B　　　　　　c) O　　　　　　d) A & B

　　5) Inheritance of plastids depends on the plastid present in cytoplasm of
　　　　a) Egg　　　　　b) Ovary　　　　c) Pollen　　　　d) Egg & Pollen

P.T.O.

6) The diploid number of chromosome in man is

a) 44 b) 46 c) 22 d) 23

7) The syndrome developed due to absence of Y chromosomes in female is called

a) Turners syndrome b) Klinfilters syndrome

c) Haemophilia d) Colorblindness

8) The sex index (X/A) is 1.00 the sex is Hemophilia

a) Male b) Female c) Super male d) Super female

9) Trisomy is expressed as

a) 2n + 1 b) 2n + 2 c) 2n − 1 d) 2n − 2

10) Principle of population genetics is founded by

a) E.M. East b) Landsteiner

c) Hardy & Weinberg d) J. Belling

2. Answer **any five** of the following : **10**

I) Define multiple allele.

II) What is extra chromosomal inheritance ?

III) What are the sex chromosomes ?

IV) What is Haemophilia ?

V) Define polyploidy.

VI) Define Holandric genes.

3. A) Answer **any two** of the following : **6**

I) Describe mitochondria inheritance.

II) Describe Down's syndrome.

III) Describe eye color in Drosophila.

B) Genic balance theory of sex determination in *Drosophila*. **4**

4. Answer **any two** of the following : **10**

   I) Describe the Hardy and Weinberg law with suitable example.

   II) Describe multiple allelism in blood groups of man.

   III) Describe the mechanism of sex determination in man.

5. Answer **any two** of the following : **10**

   I) Describe Euploidy with suitable example.

   II) Describe maternal inheritance of plastids, with suitable example.

   III) Add a note on self incompatibility in plant.

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Seat
No.

B.Sc. – III (Semester – V) (New) Examination, 2016
ZOOLOGY
Special Paper – XI : Comparative Anatomy of Chordates

Day and Date : Saturday, 2-4-2016   Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

N.B. : i) **All** questions are **compulsory**.

ii) Figures to the **right** indicate **full** marks.

iii) Draw **neat** labeled diagrams **wherever** necessary.

1. Select the appropriate answer from each of the following and rewrite the sentence.   **10**

   1) Connection between third and fourth aortic arch is called as

      a) Ductus botali   b) Ductus caroticus

      c) Truncus aorta   d) Systamic aorta

   2) _____ is the part of pelvic girdle.

      a) Ilium   b) Scapula   c) Clavical   d) Coracoid

   3) Four chambered heart present in

      a) Frog   b) Scoliodon   c) Labeo   d) Rat

   4) Lobi inferiores are present in brain of

      a) Amphioxus   b) Reptiles

      c) Elasmobranchs   d) Mammals

   5) Optic lobes are divided into two each and hence are caused corpora quadrigemina in

      a) Fish   b) Lizard   c) Frog   d) Rat

   6) _____ of pigeon secrete pigeon milk.

      a) Stomach   b) Crop   c) Pancreas   d) Intestine

   7) Uropygeal glands are present in

      a) Fishes   b) Birds   c) Amphibians   d) Mammals

8) Heterocoelus vertebrae are found in only

    a) Amphibian   b) Reptiles   c) Birds   d) Mammals

9) Rhinoceros horn is modified of

    a) Scales   b) Glands   c) Shields   d) Hairs

10) Feathers are present in

    a) Amphibia   b) Reptillia   c) Aves   d) Mammals

2. Answer **any five** of the following :   **10**

    1) Mucus gland in Amphibia.

    2) Skin of scoliodon.

    3) Typical vertebra of frog.

    4) Heart of Mammals.

    5) Brain of Reptiles.

    6) Pronephros Kidney.

3. A) Answer **any two** of the following :   **6**

    1) Soft glands in mammals.

    2) Air sacs in birds.

    3) Scoliodon brain.

  B) Hepatic portal system in frog.   **4**

4. Answer **any two** of the following :   **10**

    1) Describe Aortic archer in vertebrates.

    2) Describe hard derivatives of integument in vertebrates.

    3) Describe the mammalian glands.

5. Answer **any one** of the following :   **10**

    1) Describe the lungs of Amphibians and compare it with that of mammals.

    2) Explain evolutionary changes in heart of vertebrates.

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Seat
No.

B.Sc. – III (Semester – V) (New) Examination, 2016
MATHEMATICS (Special Paper – XI)
Integral Calculus

Day and Date : Saturday, 2-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N. B. :   1) **All** questions are **compulsory**.
          2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative of the following :   **10**

   1) If m > 0, n > 0 then integral $\int_{0}^{1} x^{m-1}(1-x)^{n-1}\, dx$ is

      a) convergent   b) divergent

      c) oscillatory   d) none of these

   2) $\int_{0}^{\infty} x^{n-1} e^{-x}\, dx$ is convergent when

      a) m > 0   b) n > 0

      c) m > 0, n > 0   d) m > 1, n > 1

   3) $\int_{0}^{1} \dfrac{dx}{x^3}$ is

      a) Proper integral

      b) Improper integral

      c) Proper and improper integral

      d) None of these

   4) Integral $\int_{0}^{\infty} \dfrac{x^{2m}}{1+x^{2n}}\, dx$ is convergent if

      a) n < m   b) n > m

      c) n = m   d) None of these

5) Another form of B(m, n) is

a) $\int_0^\infty \frac{x^{m-1}}{(1+x)^n} dx$

b) $\int_0^\infty \frac{x^{n-1}}{(1+x)^n} dx$

c) $\int_0^\infty \frac{x^{m+n-1}}{1+x} dx$

d) $\int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}} dx$

6) The value of $\int_0^1 x^4(1-x)^3 dx$ is

a) $\frac{1}{280}$

b) $\frac{1}{180}$

c) $\frac{1}{380}$

d) $\frac{1}{80}$

7) The value of $\overline{\left| -\frac{3}{2} \right.}$ is

a) $-2\sqrt{\pi}$

b) $\frac{4\sqrt{\pi}}{3}$

c) $\frac{-8\sqrt{\pi}}{15}$

d) None of these

8) Value of $\int_1^2 \int_0^{3y} y\,dy\,dx$ is

a) 3

b) 5

c) 7

d) 9

9) $\int_0^{\pi/2} \int_0^{\sin\theta} r\,d\theta\,dr =$

a) $\int_0^{\pi/2} \sin\theta d\theta$

b) $\int_0^{\sin\theta} \frac{1}{2}\pi r\,dr$

c) $\int_0^{\pi/2} \frac{1}{2}\sin^2\theta d\theta$

d) None of these

10) The double integral $\int_0^1 \int_0^1 (x^2 + y^2)dxdy$ is equal to

a) 0

b) 1

c) $\frac{1}{3}$

d) $\frac{2}{3}$

2. Attempt **any five** of the following :   **10**

   1) Examine the convergence of the improper integrals $\int_0^1 \dfrac{dx}{\sqrt{1-x^2}}$.

   2) Examine the convergence of $\int_0^1 \dfrac{dx}{x^{1/3}(1+x^2)}$.

   3) Prove that $\overline{\left|\tfrac{1}{2}\right.} = \sqrt{\pi}$.

   4) Compute $\overline{\left|\dfrac{-5}{2}\right.}$.

   5) Evaluate $\int_0^\pi \int_0^x \sin y\, dy\, dx$.

   6) Evaluate $\int_0^\pi \int_0^{a\theta} r^3\, d\theta\, dr$.

3. A) Attempt **any two** of the following :   **6**

   1) Show that $\int_0^{\pi/2} x^m \operatorname{cosec}^n x\, dx$ exists if and only if $n < (m+1)$.

   2) Prove that $B(m, n) = \int_0^\infty \dfrac{y^{n-1}}{(1+y)^{m+n}}\, dy$.

   3) Find the area of the curve $r = a(1 + \cos\theta)$, by double integration.

  B) Prove that $B(m, n) = \dfrac{\overline{|m}\ \overline{|n}}{\overline{|m+n}}$.   **4**

4. Attempt **any two** of the following :   **10**

   1) Show that $\int_0^{\pi/2} \sin x \log\sin x\, dx$ is convergent with value $\log\left(\dfrac{2}{e}\right)$.

2) Prove that $\displaystyle\int_{0}^{\pi/2} \sin^{m}\theta \cos^{n}\theta \, d\theta = \frac{\left|\overline{\left(\dfrac{m+1}{2}\right)}\right|\left|\overline{\left(\dfrac{n+1}{2}\right)}\right|}{2\left|\overline{\left(\dfrac{m+n+2}{2}\right)}\right|}$.

3) Change the order of integration in $\displaystyle\int_{0}^{\infty}\int_{x}^{\infty} \frac{e^{-y}}{y} \, dxdy$ and Evaluate.

5. Attempt **any two** of the following : **10**

1) Show that the Beta function $\displaystyle\int_{0}^{1} x^{m-1}(1-x)^{n-1}dx$, converges if and only if m > 0, n > 0.

2) Evaluate $\displaystyle\int_{0}^{\pi/2} \tan^{n}\theta d\theta$.

3) Transform to Polar coordinates and evaluate $\displaystyle\iint \sqrt{\left(\frac{1-x^{2}-y^{2}}{1+x^{2}+y^{2}}\right)} \, dxdy$

   the integral being extended over all positive values of x and y subject to $x^2 + y^2 \leq 1$.

SLR-W – 181

Seat No.

B.Sc. – III (Semester – V) (New) Examination, 2016
STATISTICS (Special Paper – XI)
Probability Distributions and Stochastic Process

Day and Date : Saturday, 2-4-2016

Time : 2.30 p.m. to 4.30 p.m.   Max. Marks : 50

Instructions : 1) **All** questions are **compulsory** and carry **equal** marks.

2) Use of **statistical tables** and **scientific calculators** is **allowed**.

1. Choose the most correct answer. **10**

   i) In the TPM $P = \begin{array}{c} \\ A \\ B \\ C \end{array} \begin{array}{ccc} A & B & C \\ \left[\begin{array}{ccc} 1/3 & 1/3 & 1/3 \\ 1/3 & 0 & 2/3 \\ 1/2 & 0 & 1/2 \end{array} \right] \end{array}$,

   Which state is absorbing state ?

   a) A   b) B   c) C   d) None of these

   ii) A stochastic process is called Markov chain if

      a) There are finite or countable number of states
      b) A future state depends upon present state and not on past tests
      c) The states are both collectively exhaustive and mutually exclusive
      d) All of these

   iii) A Markov property is based upon

      a) Expectation   b) CDF
      c) Lack of memory property   d) None of these

   iv) If X~ Laplace (μ, λ) with pdf $f(x) = \dfrac{1}{2\lambda} e^{\frac{-1}{\lambda}|x-\mu|}$, $0 < \lambda$, $-\infty < \mu, X < \infty$, then

   $P(X \geq \mu - \log 2^{\lambda}) =$

   a) 0   b) 0.5   c) 0.75   d) 0.25

P.T.O.

v) If X~ Laplace (μ, λ) with pdf as in (iv) and Y~ $\exp\left(\dfrac{1}{\lambda}\right)$ with pdf

$f(y) = \dfrac{1}{\lambda}e^{\frac{-1}{\lambda}y}$, $0 < \lambda$, $0 \leq y < \infty$ then V(X) = ... V(Y).

a) Equal   b) Half   c) Double   d) Reciprocal

vi) Let X ~ Lognormal (0, 1) r.v. then V(log X + K) =
   a) 1   b) e   c) e(e + 1)   d) e(e – 1)

vii) Let (X, Y) ~ BN $\left(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho\right)$ then regression of Y on X is

   a) $\rho \cdot \dfrac{\sigma_1}{\sigma_2}$ b) E [Y/X = x]   c) $\rho \cdot \dfrac{\sigma_2}{\sigma_1}$ d) E[X | Y = y]

viii) Let (X, Y) ~ BN $\left(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho\right)$ and $\rho = 0$ then X and Y are

   a) Uncorrelated   b) Dependent
   c) Neither a) nor b)   d) Both a) and b)

ix) If X ~ Cauchy (μ, λ) then $P(\mu - \lambda < X < \mu + \lambda)$ =
   a) 0.25   b) 0.5   c) 0.75   d) 1

x) The support of a r.v. X following normal distribution truncated below 0 is
   a) $-\infty$ to 0   b) 0 to ∞ c) $-\infty$ to ∞ d) –K to K

2. Attempt **any five** from the following :   **10**

   i) A binomial (n, p) r.v. is truncated at X = 0, write down its pmf.

   ii) If X ~ log normal (μ, σ) then find the distribution of Y = KX.

   iii) Show that for Laplace (0, 1) distribution $\mu_r = 0$ if r is odd.

   iv) If the one-step TPM is $P = \begin{bmatrix} 0.4 & 0.6 \\ 0.8 & 0.2 \end{bmatrix}$ then find two-step TPM.

   v) Define finite Markov chain, recurrent state and absorbing state.

   vi) If (X, Y) is bivariate normal $\left(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho\right)$ r.v. then state (only) conditional variance of r.v. X given Y = 5.

3. A) Attempt **any two** from the following : **6**

    i) State and prove the relation between standard Cauchy and students t distributions.

    ii) Obtain pdf of exponential distribution truncated below K.

    iii) If (X, Y) is bivariate normal r.v. with pdf $f(x, y) = K.e^{\frac{-1}{2}(x^2+y^2)}$, $-\infty < x, y < \infty$. Find K and all parameters.

  B) Assume that a man is at an integral point of X axis between X = 0 and X = 3. He takes a unit step either to the right with probability 0.7 or to the left with probability 0.3 ; unless he is at origin, when he takes a step to the right to reach at X = 1 or he is at pt. X = 3, when he takes a step to the left to reach at X = 2. Write a one step TPM and state space of this stochastic process. **4**

4. Attempt **any two** from the following : **10**

  a) Find mean of Laplace (μ, λ) distribution.

  b) Let (X, Y) ~ BN (1, 1, 4, 4, ρ) and if P(X > 4 | Y = 3) = 0.023, then find ρ.

  c) Find CDF and hence quartiles of Cauchy distribution with parameters μ and λ.

5. Attempt **any one** from the following : **10**

  a) Obtain mgf for Laplace (0, 1) distribution and hence find coefficient of skewness.

  b) Let (X, Y) ~ BN (0, 0, 5, 5, ρ) then find the distribution of $U = \dfrac{X}{Y}$ and identify the same.

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Seat No.

B.Sc. (Part – III) (Semester – V) Examination, 2016
GEOLOGY (Special Paper – XI) (New)
Environmental Geology

Day and Date : Saturday, 2-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
                        2) Figures to the **right** indicate **full** marks.
                        3) **Draw** neat diagram **wherever** necessary.

1. Fill in the blanks with correct answer from the given options :   **10**

   1) In limestone region possibility of _____ is more than other rock types.
      a) Tsunami   b) Flood
      c) Volcanic hazard   d) Subsidence

   2) Presence of _____ increases the possibility of landslide.
      a) Fault   b) Trees
      c) Gentle slope   d) Gabian structure

   3) The common solution adapted to seal the fractures and gaps in the rocks is
      _____ that can repair hazardous hill slopes.
      a) gabian   b) Grouting
      c) retention wall   d) Bolting

   4) Blasting activity in the mines can cause
      a) Cancer   b) Ulcer
      c) Ear damage   d) TB

   5) Fire caused in coal mine is due to
      a) Methane   b) CO_2
      c) O_2 d) gas

   6) In opencast mining process, _____ becomes first victims.
      a) Vegetation   b) Industries
      c) Man   d) Tall trees

   7) Pressure of water stored in the dams can cause
      a) tsunami   b) subsidence
      c) landslide   d) salination of soil

P.T.O.

8) Tropical climate in the hilly region frequently causes
   a) Landslides
   b) Flood
   c) Subsidence
   d) Volcanic hazard

9) Assam and now a days Kashmir experiences ＿＿＿＿＿＿ hazard.
   a) tsunami
   b) landslides
   c) volcano
   d) mining

10) Slope stabilization reduces the possibility of ＿＿＿＿＿＿ hazard.
   a) volcanic
   b) flood
   c) contamination
   d) landslide

2. Answer **any five** of the following :   **10**
   1) Role of mine workers in the coal mine causing hazard.
   2) Effects of illegal coal mining.
   3) Silicosis.
   4) Fluorosis.
   5) Meshing.
   6) Define flood.

3. A) Answer **any two** of the following :   **6**
   1) Volcanic hazard preparedness.
   2) River diversion.
   3) Artificial levee.

   B) Mining activities causing respiratory disease.   **4**

4. Answer **any two** of the following :   **10**
   1) Write on precaution measures and preparedness for hazard of Tsunami.
   2) Explain the carrying capacity of river with reference to flood.
   3) Explain the disastrous effects of products of volcano.

5. Answer **any two** of the following :   **10**
   1) Describe the effects of coastal hazards.
   2) Describe the geological hazards.
   3) Describe causes of cardiac disease and cancer caused due to mining process.

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Seat No.

B.Sc. (Part – III) (Semester – V) Examination, 2016
MICROBIOLOGY (Special Paper – XI) (New)
Agricultural Microbiology

Day and Date : Saturday, 2-4-2016　　　　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Figures to the **right** indicate full marks.

1. Rewrite the following sentences by selecting correct answer from given alternatives. **10**

    i) Horizons of soil consists of _____
        a) Fine particles and Mineral particles
        b) Weathered rocks
        c) Unweathered rocks
        d) Organic matters and Mineral particles

    ii) In carbon cycle initially cellulose split into _____
        a) Glucose　　　b) Millibiose　　　c) Cellobiose　　　d) Cellotriose

    iii) The process of conversion of non toxic substances to toxic substances by organisms in Soils is _____ reaction.
        a) Activation　　b) Degradation　　c) Detoxification　　d) All of these

    iv) Vanillic acid is the product formed after the biodegradation of _____
        a) Cellulose　　b) Lignin　　c) Hemicellulose　　d) Hydrocarbons

    v) *Xanthomonas oxinopoides* organism causes the infection called _____
        a) Soft rot of Potato　　　　　　　b) Whip Smut of Sugarcane
        c) Oily spot of Pomegranate　　　　d) Curling of leaves

    vi) Optimum C : N ratio required for composting is _____
        a) 50:60　　　b) 30:40　　　c) 20:30　　　d) 20:20

P.T.O.

vii) _____enzyme acts only on native molecules of Cellulose.

    a) C_{Native} b) Glucanases   c) C_1 d) C_x

viii) The cleavage of phosphorous from organic matter in Soil is done by _____ enzyme.

    a) Phosphatase   b) Phosphokinases

    c) Phosphorylases   d) Oxidases

ix) Insoil size of sand particles ranges from _____ mm.

    a) 0.001 – 0.001   b) 0.05 – 2.00   c) 2.5 – 3.5   d) 4.00 – 5.00

x) The causative agent of whip smut of sugarcane disease is _____

    a) *Xanthomonas citri*   b) *Xanthomonas compentris*

    c) *Ustilago scitaminea*   d) *Xanthomonas oxynopoides*

2. Answer **any five** of the following :   **10**

   i) What is vermicompost ?

   ii) List names of two Cellulolytic organisms.

   iii) Write properties of Soil.

   iv) Enlist two pesticide degrading bacteria.

   v) Write common symptoms of oily spot of Pomegranates.

   vi) Define diffusion reaction in Pesticide degradation.

   vii) Explain Soil Horizons.

3. A) Answer the questions in brief (**any two**) :   **6**

    i) Application of Biotechnology in Agriculture.

    ii) Write different environmental factors governing cellulose degradation.

    iii) What are the basic methods of microbial Phosphorus mineralization in Soil ?

  B) Write biochemistry of Cellulose degradation.   **4**

4. Answer **any two** of the following. **10**

   i) Write in brief biodegradation of Pesticides.

   ii) Explain in short sulphur cycle.

   iii) Write in detail biodegradation of Lignin.

5. Answer **any two** of the following. **10**

   i) Explain in brief biodegradation of Hemicelluloses.

   ii) Write on role of microorganisms in Carbon Cycle.

   iii) Write about Soil as an Ecosystem.

_____

Seat
No.

B.Sc. – III (Semester – V) (New) Examination, 2016
ELECTRONICS
Fundamentals of Microcontroller (Special Paper – XI)

Day and Date : Saturday, 2-4-2016

Time : 2.30 p.m. to 4.30 p.m.   Max. Marks : 50

Instructions : 1) **All** questions are **compulsory**.

2) Figures to the **right** indicate **full** marks.

3) Draw the diagram **wherever** necessary.

4) Use of log tables or calculator is allowed.

1. Select the correct alternative for the following :   **10**

   i) The RAM space in 8051 microcontroller is

      a) 8 byte   b) 128 byte   c) 2k byte   d) 4k byte

   ii) _____ is open drain port.

      a) Port 0   b) Port 1   c) Port 2   d) Port 3

   iii) The number of SFR in microcontroller 8051 is

      a) 5   b) 11   c) 15   d) 21

   iv) Mode 2 of microcontroller timer operates as

      a) 13 bit timer   b) 16 bit timer

      c) 8 bit split timer   d) 8 bit auto reload

   v) The number of banks in 8051 are

      a) Two   b) Four   c) Eight   d) Sixteen

   vi) If set bit 07 instruction executed then result will be checked in _____ location.

      a) 20 H   b) 17 H   c) 07 H   d) 00 H

   vii) The SFR address of port 0 is

      a) 80 H   b) 90 H   c) C0 H   d) A0 H

viii) By default the stack pointer location is
    a) 07 H   b) 17 H   c) 27 H   d) 37 H

ix) When power supply is ON then all ports of microcontroller are have _____ output.
    a) 00 H   b) 0F H   c) F0 H   d) FFH

x) _____ is 8K EPROM chip.
    a) 2708   b) 2716   c) 2764   d) 27128

2. Answer **any five** (**two** marks **each**) :   **10**

  i) Differentiate between ROM and RAM.

  ii) Differentiate between microprocessor and microcontroller.

  iii) Enlist the bit addressable SFR.

  iv) Write the different functions of Port 3.

  v) Name the different addressing modes of 8051 microcontroller.

  vi) Give the modes of timer of 8051.

3. A) Answer **any two** (**three** marks **each**) :   **6**

    i) Describe the RAM structure of 8051.

    ii) Draw pin diagram of 2764.

    iii) Differentiate between ACALL and AJMP instructions.

  B) Write ALP to add the two eight bit numbers stored in R_0 and R_1 and store result in R_2.   **4**

4. Answer **any two** (**five** marks **each**) :   **10**

  i) Write the salient features of microcontroller 8051.

  ii) Explain any two logical instructions with example.

  iii) Write ALP to generate square wave at port P 1.0.

5. Answer **any one** :   **10**

  i) What do you mean by subroutine ? Write a delay program using subroutine.

  ii) Draw the pin diagram of 8051 microcontroller, describe functions of each pin.

_____

Seat No.	

B.Sc. – III (Semester – V) (New) Examination, 2016
PHYSICS (Special Paper – XII)
Nuclear Physics

Day and Date : Monday, 4-4-2016　　　　　　　　　Total Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : i) **All** questions are **compulsory**.

　　　　　　　ii) Figures to the **right** indicate **full** marks.

　　　　　　　iii) Draw **neat** diagram **wherever** necessary.

　　　　　　　iv) **Use** of calculator or log table is **allowed**.

1. Select the correct alternative : **10**

　i) In cyclotron, time for semicircular path of ion is _____ for each revolution.

　　a) increases　　b) decreases　　c) constant　　　d) zero

　ii) An accelerator is used for increasing _____ of charged particles.

　　a) kinetic energy　　　　　　b) potential energy

　　c) binding energy　　　　　　d) surface energy

　iii) The radius of nucleus is directly proportional to _____ of atomic mass number.

　　a) square root　　b) cube root　　c) square　　　d) cube

　iv) When α - particle strikes on screen coated with ZnS then flash of light is emitted. This principle is used in _____

　　a) G.M. counter　　　　　　b) Bubble chember

　　c) Scintillation counter　　　d) Proportional counter

　v) The mass defect per nucleons is called

　　a) binding energy　　　　　　b) fission energy

　　c) nucleus fraction　　　　　　d) packing fraction

　vi) In stripping reaction, product and target nuclei are

　　a) isotopes　　b) isobars　　c) isomers　　　d) projectiles

vii) For heavy nuclei (i.e. in natural radioactivity), α - disintegration energy ($Q\alpha$) is

    a) positive   b) negative   c) zero   d) infinite

viii) Neutrino hypothesis was postulated by

    a) Einstein   b) Rutherford   c) Pauli   d) J.J. Thomson

ix) Hydrons means

    a) heavy   b) bulky   c) light in weight   d) weightless

x) Neutron was discovered by

    a) C.D. Anderson   b) Newton

    c) Einstein   d) Chadwick

2. Attempt **any five** of the following :   **10**

   i) State the condition of betatron.

   ii) State principle of bubble chember.

   iii) Define binding energy and mass defect.

   iv) What is stripping reaction ?

   v) Explain continuous β-ray spectrum.

   vi) Explain strong and weak interactions.

3. A) Attempt **any two** of the following :   **6**

    i) Explain liquid drop model of nucleus.

    ii) Obtain equation for Q-value of nuclear reaction.

    iii) Explain experimental study of β-decay.

  B) Calculate Q-value of the following reaction and indicate type of reaction   **4**

$$_2He^4 + \,_7N^{14} \rightarrow \,_8O^{17} + \,_1H^1$$
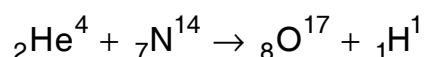
Given : Mass of He^4 = 4.0038727 amu

          Mass of N^{14} = 14.003074 amu

          Mass of O^{17} = 16.999133 amu

          Mass of H^1 = 1.007825 amu

     and 1 amu = 931 MeV.

4. Attempt **any two** of the following : **10**

   i) Obtain semi-empirical mass formula.

   ii) Define α-disintegration energy and show that it is nearly equal to the Q-value of α-disintegration reaction.

   iii) Explain classification of elementary particles.

5. Attempt **any one** of the following : **10**

   i) Explain construction and working of cyclotron. Obtain equation for velocity of ion in cyclotron.

   ii) Explain construction and working of G.M. Counter. Explain Geiger plateau, dead time and recovery time of G.M. Tube.

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Seat
No.

B.Sc. – III (Semester – V) (New) Examination, 2016
CHEMISTRY (Special Paper – XII)
Analytical and Industrial Physical Chemistry

Day and Date : Monday, 4-4-2016   Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.

2) Draw **neat** diagrams and give equations **wherever** necessary.

3) Figures to the **right** indicate **full** marks.

1. Select the most correct alternative from among those given below and rewrite the
   sentence :   **10**

   1) Cell constant (x) is given by _____

   a) $x = a/l$ b) $x = axl$

   c) $x = l/a$ d) $x = lxa$

   2) Flame photometry is also named as _____ spectroscopy.

   a) atomic   b) flame emission

   c) molecular   d) none of these

   3) The potentiometer is standardized at _____.

   a) 1.00 V   b) 1.018 V

   c) 0.34 V   d) 0.76 V

   4) The device used to measure the response of photocell is called as _____.

   a) voltmeter   b) conductometer

   c) galvanometer   d) all of these

P.T.O.

5) A certain minimum external voltage required to commence a continuous electrolytic decomposition is known as _____

   a) decomposition potential
   b) electrolysis
   c) current voltage
   d) none of these

6) Titrations in which end points are determined by emf measurements and precipitation occurs are called _____ titration.

   a) acid-base
   b) redox
   c) precipitation
   d) none of these

7) When the temperature of flame is increased, the intensity of emitted radiations _____.

   a) decreases
   b) increases
   c) first decreases, then increases
   d) remains constant

8) In chromium plating, generally _____ is used as anode.

   a) Pb
   b) Cr
   c) Ni
   d) Cu

9) According to latest convention, the emf of the cell may be expressed as, _____

   a) $E = E_R - E_L$
   b) $E = E_L - E_R$
   c) $E = E_R + E_L$
   d) $E = E_R \times E_L$

10) In simple flame photometers _____ is used as monochromator.

   a) prism
   b) grating
   c) slit
   d) all of these

2. Answer **any five** of the following : **10**

   i) Define the term transmission (T).

   ii) Give any two advantages of glass electrode.

   iii) State Faraday's laws of electrolysis.

   iv) Give two characteristics of burner.

   v) How is conductivity water prepared in the laboratory ?

   vi) Write any two applications of nickel plating.

3. A) Answer **any two** of the following : **6**

    i) How cell constant is determined ?

    ii) What are the advantages of flame photometry ?

    iii) State and explain Lambert's law.

  B) Explain role of brighteners in electroplating. **4**

4. Answer **any two** of the following : **10**

  i) What are the advantages of potentiometric titrations ?

  ii) Explain the application of flame photometry in qualitative analysis.

  iii) Draw schematic diagram of single cell photoelectric colorimeter.

5. Answer **any two** of the following : **10**

  i) Explain in brief electroplating equipment.

  ii) Give the construction and working of calomel electrode.

  iii) Write a note on conductometric titration of weak acid and strong base.

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Seat
No.

B.Sc. (Part – III) (Semester – V) (New) Examination, 2016
ZOOLOGY (Special Paper – XII)
Developmental Biology

Day and Date : Monday, 4-4-2016　　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Figures to the **right** indicate **full** marks.
　　　　　　　　3) Draw **neat** labelled diagrams **wherever** necessary.

1. Select the appropriate answer from each of the following and rewrite the sentence :　**10**

   1) The process of formation of sperm is called
      a) Oogenesis　　　　　　　　b) Spermatogenesis
      c) Mitosis　　　　　　　　　d) Ovulation

   2) The egg of Amphioxus is termed as _____ egg.
      a) Megalecithal　　　　　　　b) Microlecithal
      c) Macrolecithal　　　　　　d) Polylecithal

   3) Fertilizin is _____ in nature.
      a) Protein　　　　　　　　　b) Carbohydrates
      c) Fats　　　　　　　　　　d) Glycoprotein

   4) Holoblastic and unequal cleavage is found in
      a) Chick　　　　　　　　　　b) Grasshopper
      c) Amphioxus　　　　　　　　d) Insects

   5) _____ pairs of somites are found in chick embryo of about 24 hrs. stage.
      a) 4　　　　　b) 8　　　　　c) 12　　　　　d) 10

   6) The coelomic cavity, gastrocoel is also termed as
      a) Blastocoel　　　　　　　　b) Stomodaeum
      c) Archenteron　　　　　　　d) Coelenteron

P.T.O.

7) Major nutritive foetal membrane in chick embryo is
   a) Yolk sac   b) Amnion   c) Chorion   d) Allantoise

8) The smallest spermatozoan is found in
   a) Human   b) Frog   c) Chick   d) Amphioxus

9) Physiological connection between mother and developing embryo in mammal is
   a) Placenta   b) Foetal membrane
   c) Notochord   d) Mesoderm

10) In chick, hatching occurs after about _____ days.
   a) 28   b) 35   c) 42   d) 21

2. Answer **any five** of the following :   **10**
   i) Structure of egg of Amphioxus.
   ii) Structure of spermatozoan of chick.
   iii) Centrolecithal egg.
   iv) Discoidal cleavage.
   v) Internal fertilization.
   vi) Somites.
   vii) Radial cleavage.

3. A) Answer **any two** of the following :   **6**
   i) Acrosome reaction during fertilization.
   ii) Fate map
   iii) Cleidoic egg.

   B) Functions of placentae.   **4**

4. Answer **any two** of the following :   **10**
   i) Describe haemochorial placenta.
   ii) Blastula of Amphioxus.
   iii) Spermatogenesis.

5. Answer **any one** of the following :   **10**
   i) What are foetal membranes ? Describe any two foetal membranes in chick.
   ii) Describe chick embryo of about 48 hrs. incubation.

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Seat
No.

B.Sc. III (Semester – V) (New) Examination, 2016
MATHEMATICS (Special Paper – XII)
Partial Differential Equations

Day and Date : Monday, 4-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Figures to the **right** indicate **full** marks.

1. Select the correct alternative for each of the following. **10**

　　1) The general solution of the linear partial differential equation $Pp + Qq = R$ is
　　　　_____, where $u \equiv u\,(x, y, z)$ and $v \equiv v(x, y, z)$

　　　　a) $\phi\,(u, v) = x$　　　　　　　　b) $\phi\,(u, v) = -y$

　　　　c) $\phi\,(u, v) = 0$　　　　　　　　d) None of these

　　2) The general solution of $xzp + yzq = xy$ is

　　　　a) $\phi\left(\dfrac{x}{y}, \dfrac{y}{z}\right) = 0$　　　　　　b) $\phi\,(x - y, y - z) = 0$

　　　　c) $\phi\,(x^2 - y^2, y^2 - z^2) = 0$　　　　d) None of these

　　3) The p.d.e obtained by eliminating the arbitrary function ϕ from $z = \phi\,(x + y)$
　　　　is

　　　　a) $z = pq$　　　　b) $z = p + q$　　　　c) $pq = i$　　　　d) $p = q$

　　4) In the solution of differential equation $(D^2 - 2DD^1 + D^{12})\,z = e^{x+2y}$ then P.I.
　　　　is

　　　　a) $x + 2y$　　　　b) e^{x+2y}　　　　c) e^{2x+y}　　　　d) None of these

　　5) In the solution of differential equation $(D + 2D')\,(D + D')z = x + y$ then c.f. is

　　　　a) $\phi_1(y - 2x) + \phi_2(y - x)$　　　　b) $\phi_1(2y + x) + \phi_2\,(y + 2x)$

　　　　c) $\phi_1(x - y) + \phi_2(x + y)$　　　　d) None of these

P.T.O.

6) The general solution of $(D - D^{12}) z = 0$ is

   a) $z = \sum A e^{K^2 x + ky}$ where A and K are arbitrary constant

   b) $z = \sum A e^{Kx+y}$ where A and K are arbitrary constant

   c) $z = A e^{Kx+Ky}$ where A and K are arbitrary constant

   d) $z = A e^{K^2 x + Ky}$ where A and K are arbitrary constant

7) The general solution of $t + s + q = 0$ is

   a) $\phi_1(x) + \phi_2(y - x)$ b) $\phi_1(x) + e^{-x}\phi_2(y - x)$

   c) $\phi_1(x) + e^{x}\phi_2(y - x)$ d) $\phi_1(x) + e^{x}\phi_2(y + x)$

8) The complete integral of $pq = K$ is

   a) $z = ax + \left(\dfrac{K}{a}\right) y + b$ b) $z = ax - \left(\dfrac{K}{a}\right) y + b$

   c) $z = ax + \left(\dfrac{a}{K}\right) y + b$ d) None of these

9) A solution obtained by giving particular value to arbitrary constants in the complete solution is called

   a) Singular solution   b) Complete solution

   c) Particular solution   d) Non-singular solution

10) The first order partial differential equations $p = P(x, y)$, $q = Q(x, y)$ are compatible iff

   a) $\dfrac{\partial P}{\partial y} = \dfrac{\partial Q}{\partial x}$ b) $\dfrac{\partial P}{\partial x} = \dfrac{\partial Q}{\partial y}$

   c) $\dfrac{\partial P}{\partial y} = -\dfrac{\partial Q}{\partial x}$ d) $\dfrac{\partial P}{\partial x} = -\dfrac{\partial Q}{\partial y}$

2. Attempt **any five** of the following. **10**

   1) Form p.d.e by eliminating arbitrary constant from the relation

$$z = axe^y + \frac{1}{2}x^2e^{2y} + b.$$

   2) Solve $p - 2q = 3x^2 \sin(y + 2x)$.

   3) Find complete integral $p^2 + q^2 = m^2$ where m is constant.

   4) Show that the differential equation $p = x^2 - ay$, $q = y^2 - ax$ are compatible.

   5) Solve : $(D^4 - D'^4) z = 0$

   6) Solve : $(D^2 - D'^2 + D - D') z = 0$.

3. A) Attempt **any two** of the following. **6**

     1) From p.d.e by eliminating arbitrary functions f and g from
       $z = f(x^2 - y) + g(x^2 + y)$.

     2) Solve $(D^2 + 3DD' + 2D'^2)z = x + y$.

     3) Find singular integral from $2xz - px^2 - 2qxy + pq = 0$.

  B) Explain the method of solving the equation of the form $f(p, q) = 0$. **4**

4. Attempt **any two** of the following. **10**

   1) Find the integral surface of the linear p.d.e $x(y^2 + z) p - y(x^2 + z)q = (x^2 - y^2)z$.

   2) Show that the equations $xp = yq$ and $z(xp + yq) = 2xy$ are compatible and solve them.

   3) Solve $(D^3 - 6D^2D' + 11DD'^2 - 6D'^3) z = e^{5x+6y}$.

5. Attempt **any one** of the following. **10**

   1) Explain Charpits method for solving the p.d.e. $f(x, y, z, p, q) = 0$ where x and y are

     independent variables and $p = \dfrac{\partial z}{\partial x}, q = \dfrac{\partial z}{\partial y}$ and hence solve $p^2 - y^2q = y^2 - x^2$.

   2) Show that the solution of $(D - mD')^2 z = 0$ is $z = \phi_1(y + mx) + x\phi_2(y + mx)$
     and hence solve $(D - D')^2 z = \tan(y + x)$.

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SLR-W – 191

B.Sc. (Part – III) (Semester – V) Examination, 2016
STATISTICS (Special Paper – XII) (New)
Operations Research and Applied Statistics

Day and Date : Monday, 4-4-2016   Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

Instructions : i) *All* questions are *compulsory*.

          ii) *Use* of simple or scientific calculator is allowed.

          iii) Figures to the **right** indicate **full** marks.

1. Select most correct alternative :   **10**

   i) A necessary and sufficient condition for a basic feasible solution to a maximization LPP to be an optimum is that (for all j) :

     a) $z_j - c_j \neq 0$ b) $z_j - c_j \leq 0$

     c) $z_j - c_j = 0$ d) $z_j - c_j \geq 0$

   ii) Which of the following is not correct ?

     a) It is not possible to obtain feasible solution of an LPP by graphical method

     b) A feasible region of an LPP must be convex set

     c) The feasible region is also termed as solution space

     d) A feasible solution of an LPP is independent of the objective function

   iii) In final (optimum) simplex table, if $z_j - c_j = 0$ for at least one non-basic variable, then there will be

     a) Infeasible solution   b) unbounded solution

     c) alternate solution   d) no solution

P.T.O.

iv) The initial solution of a transportation problem obtained by

   a) North-West corner rule would invariably be optimum

   b) VAM would invariably be very near to optimum solution

   c) Least cost method does not provide the least cost solution to a T.P.

   d) MODI method is infeasible

v) In assignment problem the minimum number of lines covering all zeros in a reduced cost matrix of order 3 can be

   a) at the least 3   b) at the most 3

   c) 2   d) 3

vi) In a Single Sampling Plan of sample size n and acceptance number c, if the number of observed defectives d is equal to c, then

   a) the lot is rejected

   b) the lot is accepted

   c) we cannot take the decision of accepting or rejecting the lot

   d) the lot is rejected or accepted

vii) The slack for an activity in network is equal to

   a) LS-ES   b) LF-LS   c) EF-ES   d) EF-LS

viii) The consumer will often design the sampling procedure so that the OC curve gives _____ probability of acceptance at the AQL.

   a) a very low   b) a low   c) a high   d) zero

ix) If there are 3 workers and 3 jobs in the assignment problem, there would be

   a) 3 solutions   b) 6 solutions

   c) 2 solutions   d) 216 solutions

x) In critical path analysis, CPM is

   a) deterministic in nature   b) probabilistic in nature

   c) dynamic in nature   d) event oriented

2. Answer **any five** of the following.   **10**

   i) Give a canonical form of a LPP in matrix form.

   ii) Define an artificial variable.

   iii) When is a solution of a transportation problem said to be a degenerate one ?

   iv) Define Producer's risk.

   v) What is a balanced Assignment problem ?

   vi) Define optimistic time in a PERT.

3. A) Answer **any two** of the following.   **6**

   i) Define Project duration, earliest event time and latest event time.

   ii) Give the mathematical form of an Assignment problem.

   iii) Give the formulae of determining A.T.I. and A.O.Q. in a Single Sampling Plan.

   B) For a Single Sampling Plan with lot size N, n = 10, c = 1 and p = 0.018 find the probability of rejection of the lot.   **4**

4. Answer **any two** of the following.   **10**

   i) Find IBFS to the following transportation problem by using North-West corner method.

<table>
<thead>
<tr><th></th><th></th><th colspan="4">To</th><th></th></tr>
<tr><th></th><th></th><th>D</th><th>E</th><th>F</th><th>G</th><th>Available</th></tr>
</thead>
<tbody>
<tr><td rowspan="3">From</td><td>A</td><td>11</td><td>13</td><td>17</td><td>14</td><td>250</td></tr>
<tr><td>B</td><td>16</td><td>18</td><td>14</td><td>10</td><td>300</td></tr>
<tr><td>C</td><td>21</td><td>24</td><td>13</td><td>10</td><td>400</td></tr>
<tr><td></td><td>Demand</td><td>200</td><td>225</td><td>275</td><td>250</td><td></td></tr>
</tbody>
</table>

ii) A project schedule has the following activities and the time (in months) of completion of each activity is as follows :

Activity	1 – 2	2 – 3	2 – 4	3 – 4
Time	8	4	15	16

Draw the network diagram and find the minimum time of completion of the project.

iii) Write a procedure of Graphical method of solving a LPP.

5. Answer **any one** of the following. **10**

i) Write a procedure of Double Sampling Plan.

ii) The following assignment problem shows the costs of assigning four tasks to four men. Determine the optimum assignment schedule.

Men

Tasks		I	II	III	IV
	A	18	26	17	11
	B	13	28	14	26
	C	38	19	18	15
	D	19	26	24	10

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Seat No.

B.Sc. (Part – III) (Semester – V) Examination, 2016
GEOLOGY (Special Paper – XII) (New)
Hydrogeology and Remote Sensing

Day and Date : Monday, 4-4-2016　　　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) ***All*** questions are ***compulsory***.
　　　　　　　　 2) Figures to the ***right*** indicate ***full*** marks.
　　　　　　　　 3) ***Draw*** neat diagram ***wherever*** necessary.

1. Fill in the blanks with correct answer from the given options :　　　**10**

　　1) Source for ground water from the space is called _____

　　　　a) Juvenile　　　b) Cosmic　　　c) Connate　　　d) Surface

　　2) Generally water table follows _____

　　　　a) Slope　　　b) Fractures　　　c) Topography　　d) Dyke

　　3) Process of entry to surface water from the surface in to the ground is called _____

　　　　a) Infiltration　　b) Seepage　　　c) Spring　　　d) Leakage

　　4) Rock formation below the water table is _____

　　　　a) Dry　　　　　　　　　b) Aquifer
　　　　c) Saturated with water　　　d) Aquitard

　　5) Over flowing bore-well in summer may be due to _____

　　　　a) Heavy rain　　　　　　　　b) Pearched aquifer
　　　　c) Artesian condition of aquifer　　d) Good aquifer

　　6) Linear feature _____ in an image express the structural feature.

　　　　a) Lineament　　b) Foliation　　c) Fold　　　d) Lineation

　　7) Basin in an image is identified _____

　　　　a) Dendritic　　b) Centripetal　　c) Radial　　　d) Lost river

　　8) Desert in an image in identified by _____

　　　　a) Dykes　　　　　　　b) Scanty vegetation and lost river
　　　　c) Fault　　　　　　　d) Fold

P.T.O.

9) The wavelength of visible spectral band is from _____ µ m.

   a) 0.3 – 0.07   b) 0.4 – 0.7   c) 0.05 – 0.08   d) 0.03 – 0.08

10) Trellis drainages showing opposite flow set up are indicators of _____

   a) Slope   b) Escarpment   c) Fault   d) Ridge

2. Answer **any five** of the following :   **10**

   a) Overlap

   b) Senser

   c) Platform

   d) Aquifer

   e) Porosity

   f) Transmissivity.

3. A) Answer **any two** of the following :   **6**

   1) Vegetation in an image and its significance.

   2) Significance of linear structures in an image.

   3) Gravity Spring.

   B) Vertical Distribution of ground water.   **4**

4. Answer **any two** of the following :   **10**

   1) Describe the hot springs. Draw its diagram and give Indian examples.

   2) Describe confined aquifer. Draw its diagram.

   3) Identification of fault using an image.

5. Answer **any two** of the following :   **10**

   1) Describe the watershed. Draw diagram.

   2) What is drainage pattern ? Describe significance of radial drainage pattern.

   3) What are lineaments ? Describe the significance of linear structures in an image.

_____

Seat
No.

B.Sc. (Semester – V) (New) Examination, 2016
MICROBIOLOGY (Special Paper No. – XII)
Immunology

Day and Date : Monday, 4-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) Figures to the **right** indicate **full** marks.
2) **All** questions are **compulsory**.
3) Draw **neat** labelled diagrams **wherever** required.

1. Rewrite the sentences after choosing correct answer from the given alternatives. **10**

   i) Cytokines are _____

   a) low molecular wt proteins   b) high molecular weight

   c) both a and b   d) None of these

   ii) The MHC in mouse called H2 gene complex is located on chromosome no. _____ in mice.

   a) 16   b) 6   c) 14   d) 17

   iii) Bacteria, neoplastic cellls, virus infected cells as well as intracellular parasites containing cells are destroyed by

   a) T lymphocytes   b) NK cells

   c) B lymphocytes   d) Phagocytes

   iv) Cell mediated immunity protects the body from _____ pathogenic agents.

   a) Intracellular   b) extracellular   c) both a and b   d) None of these

   v) In an autoimmune Masthenia gravis autoantibodies are produced against.

   a) RBC   b) WBC

   c) Thyroid hormones   d) acetyl choline receptors

vi) An antibody response to foreign tissue is suppressed in which of the following phenomenon ?

    a) immune tolerance   b) immune enhancement

    c) autoimmunity   d) none of these

vii) Activated B lymphocyte after antigenic stimulus get differentiated into
_____

    a) Plasma and memory cells   b) Plasma and CD4 cells

    c) NK cells and plasma cells   d) NK cells and memory cells

viii) In an auroimmune disease idiopathic thrombocytopic purpura autoantibodies are produced against

    a) Lymphocytes   b) RBC   c) Platelets   d) WBC

ix) Mast cell _____

    a) circulate in the blood stream   b) are phagocytic

    c) Release histamine   d) are found in lymph nones

x) _____ antibody pass through placenta.

    a) Ig A   b) Ig M   c) Ig G   d) Ig E

2. Answer in **one** or **two** sentences (**any five**).   **10**

   i) Define monoclonal antibodies

   ii) Blood groups

   iii) Complement

   iv) Cell mediated immunity

   v) Antigen

   vi) B-Lymphocyte.

3. A) Write in brief (**any two**).   **6**

   i) Rh blood group system.

   ii) Differentiate between immediate and delayed type hypersensitivity.

   iii) Enlist functions of monoclonal antibodies.

 B) Describe properties and functions of cytokines.   **4**

4. Answer **any two**.   **10**

    i) What is hybridoma technology ?

    ii) Blood transfusion reactions.

    iii) Explain mechanism of immediate type of hypersensitivity.

5. Answer **any two.**   **10**

    i) Anaphylaxis

    ii) Properties of complement

    iii) Write on cells involved in cell mediated immunity.

_____

Seat
No.

B.Sc. (Part – III) (Semester – V) (New) Examination, 2016
ELECTRONICS (Special Paper – XII)
Sensors and Instrumentation

Day and Date : Monday, 4-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions :   1) *All* questions are *compulsory.*
                2) *Figures to the **right** indicate **full** marks.*
                3) *Draw **neat** diagrams **wherever** necessary.*
                4) ***Use** of log-table and calculator is **allowed.***

1. Select correct alternative :   **10**

    i) The minimum and maximum values of an input quantity for which an instrument is designed to measure is called

       a) hysteresis   b) threshold   c) range or span   d) sensitivity

    ii) The front-end of any measurement system is

       a) transducer or sensor   b) signal conditioning unit

       c) display unit   d) control unit

    iii) Which one of these is an active transducer ?

       a) LVDT   b) RTD   c) Thermistor   d) Thermocouple

    iv) LVDT is _____ type of transducer.

       a) resistive   b) capacitive

       c) inductive   d) photoconductive

    v) _____ transducer from the following has highest light sensitivity.

       a) Solar cell   b) LDR   c) Photodiode   d) Phototransistor

    vi) As far as speed of operation is concerned LCD displays are _____ LED displays.

       a) faster than   b) slower than   c) of same speed as   d) like static

    vii) In load cell or weighing scale signal conditioning system the number of strain gauges to be connected in bridge circuit so as to double the sensitivity of the bridge is

       a) 1   b) 2   c) 3   d) 4

                                                                         P.T.O.

   viii) A signal system is named dc or ac signal conditioning system based on the use of

      a) transducer   b) bridge network

      c) excitation source   d) calibration network

   ix) The basic objective of DAS is

      a) to acquire data at correct speed and time

      b) to process the data

      c) to provide effective human interface

      d) all of these

   x) The most important component of DAS is

      a) controller unit   b) signal conditioning unit

      c) sensor or transducer   d) A/D converter

2. Answer **any five** (**two** marks **each**) :   **10**

   i) Define resolution.

   ii) Briefly explain the principle of RTD.

   iii) Give the principle and list the applications of piezoelectric sensor.

   iv) Explain the principle of solenoid.

   v) Explain in brief any one signal isolation technique.

   vi) Explain working of phototransistor.

3. A) Answer **any two** (**three** marks **each**) :   **6**

     i) Discuss the types of errors in measurement.

     ii) Give the performance parameters of a sensor or transducer.

     iii) Explain dot-matrix LED display.

  B) Write a note on dc signal conditioning system.   **4**

4. Answer **any two** (**five** marks **each**) :   **10**

   i) Write a note on bonded strain gauge.

   ii) Explain the construction and operation of stepper motor.

   iii) Write a note on gas sensor.

5. Answer **any one** :   **10**

   i) Explain with neat circuit diagram, the operation of instrumentation amplifier. Hence deduce the equation for output voltage.

   ii) Discuss data logger system.

_____

Seat
No.

B.Sc. – III (Semester – V) (New) Examination, 2016
COMPUTER SCIENCE
Special Paper – XII : Data Communications and Networking – I

Day and Date : Monday, 4-4-2016　　　　　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N. B. :　1) **All** questions are **compulsory**.
　　　　　2) Figures to the **right** indicate **full** marks.

1. Choose correct alternatives :　　　　　　　　　　　　　　　　　　　　**10**

　　1) The process-to-process delivery of the entire message is the responsibility
　　　　of the _____ layer.
　　　　a) Transport　　　　　　　　　b) Application
　　　　c) Physical　　　　　　　　　　d) Network

　　2) The Transmission Control Protocol (TCP) is a _____ protocol.
　　　　a) Connection-oriented　　　　b) Reliable
　　　　c) Connectionless　　　　　　　d) None of the above

　　3) The OSI model consists of _____ layers.
　　　　a) Eight　　　　b) Seven　　　　c) Five　　　　d) Three

　　4) Circuit switching takes place at the _____ layer.
　　　　a) Physical　　　　　　　　　　b) Data link
　　　　c) Network　　　　　　　　　　d) Transport

　　5) Checksum Check uses _____ arithmetic.
　　　　a) One's complement　　　　　b) Two's complement
　　　　c) Either (a) or (b)　　　　　　d) None of the above

　　6) The _____ between two words is the number of differences between
　　　　corresponding bits.
　　　　a) Hamming rule　　　　　　　b) Hamming code
　　　　c) Hamming distance　　　　　d) None of the above

　　7) The divisor in a cyclic code is normally called the _____
　　　　a) Redundancy　　　　　　　　b) Degree
　　　　c) Generator　　　　　　　　　d) None of the above

P.T.O.

8) _____ augments the CSMA algorithm to detect collision.
   a) CSMA/CD
   b) CSMA/CA
   c) Either (a) or (b)
   d) Both (a) and (b)

9) _____ cable consists of an inner copper core and a second conducting outer sheath.
   a) Twisted-pair
   b) Shielded twisted-pair
   c) Coaxial
   d) Fiber-optic

10) Microwaves are _____ directional.
    a) Omni
    b) Bi
    c) Uni
    d) None of the above

2. Answer **any five** of the following :   **10**
   1) What is Byte stuffing ?
   2) Define bandwidth and frequency.
   3) What is meant by Internet working ?
   4) Define Amplitude Modulation.
   5) Define noise. Mention the types of noise.
   6) What is meant by full duplex data flow ?

3. A) Answer **any two** of the following :   **6**
      1) Explain Ring topology.
      2) Explain the characteristics of data communications system.
      3) Explain various design issues of Network layer.

   B) Explain WAN and MAN in detail.   **4**

4. Answer **any two** of the following :   **10**
   1) Explain Co-axial cable in detail.
   2) Explain Slotted ALOHA.
   3) Explain Message switching in detail.

5. Answer **any two** of the following :   **10**
   1) Explain Shortest Path Routing.
   2) Explain the Network Criteria.
   3) Explain Go-Back-n protocol.

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SLR-W – 196

B.Sc. – III (Semester – V) Examination, 2016
ENGLISH COMPULSORY
Countdown : English Skills for Success (Old)

Day and Date : Wednesday, 30-3-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. A) Rewrite the following bits by choosing the correct options.   **6**

    1) Raman was a _____ reader.
       a) Virtuous   b) Vicious   c) Voracious   d) Vigorous

    2) In Cuddalore, communication system was set up with the help of _____
       radio operators.
       a) SHAM   b) FM   c) FAM   d) HAM

    3) For a boy of fourteen his home is the only _____
       a) hell   b) paradise   c) den   d) torture

    4) "Life is real! Life is earnest! And the grave is not its _____"
       a) goal   b) gaol   c) name   d) origin

    5) The mother in "Village Song" shows _____ for her daughter.
       a) anger   b) concerns   c) hope   d) light

    6) The Tsunami turned the land in Cuddalore _____
       a) sweet   b) bitter   c) saline   d) fertile

   B) Choose the correct modals and rewrite the bits.   **2**

    1) It _____ rain, for there are clouds in the sky.
       a) can   b) may   c) will   d) might

    2) She _____ sing, when she was a child.
       a) will   b) can   c) used to   d) must

P.T.O.

C) Do as directed. **2**

1) He said to the stranger, "Who are you ?" (Make Indirect speech)

2) Padma congratulated Pratik on his promotion. (Make Direct Speech)

2. Answer **any five** of the following questions in short. **10**

1) Why did Raman move to Culcatta ?

2) What was the first and fore most task in disaster management in Cuddalore ?

3) Why did Phatik go with Bishamber to Culcatta ?

4) What experiment did Raman do on musical instruments ?

5) How were the community kitchens managed in Cuddalore ?

6) How was phatik treated by his maternal aunt ?

3. A) Answer **any two** of the following : **6**

1) How has H W Long fellow depicted the importance of the present time in his "A Psalm of Life" ?

2) What was the girl in the poem "Village song" a Fraid of ?

3) What is the central theme of Long Fellow's "A Psalm of Life" ?

B) Write reports on **any two** of the following bits. **4**

1) Visit to the Gadda Fair.

2) A trip to Bijapur.

3) Nature in Jammu and Kashmir.

4. 1) Think of a product to be promoted in the market. It could be a two wheeler. Prepare a presentation with five charts/slides. **10**

OR

2) Prepare a presentation script with five slides on the topic "India Against corruption".

5. Prepare and write group discussion on the topic Environmental pollution. **10**

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SLR-W – 197

Seat No.	

B.Sc. (Part – III) (Semester – V) (Old) Examination, 2016
PHYSICS (Special Paper – IX)
Mathematical Physics and Statistical Physics

Day and Date : Thursday, 31-3-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N. B. : i) **All** questions are **compulsory**.
ii) **Draw** diagrams **wherever** necessary.
iii) Figures to the **right** indicate **full** marks.
iv) **Use** of calculators is **allowed**.

1. Select the correct alternative :   **10**

1) Weins displacement law is expressed as

   a) $\lambda_m T$ = const.

   b) $\lambda_m T^2$ = const.

   c) $\lambda_m T^{1/2}$ = const.

   d) $\lambda_m T^4$ = const.

2) All accessible microstates corresponding to a possible macrostate are
   a) Less probable
   b) More probable
   c) Equally probable
   d) None of the above

3) The particles obeying F-D statistics are
   a) Photons
   b) Electrons
   c) Gas molecules
   d) Distinguishable

4) In orthogonal curvilinear coordinate system, the coordinate surfaces are
   a) Plane   b) Curved   c) Spherical   d) Cylindrical

5) The scale factors for cylindrical coordinates corresponds to
   a) $1, \rho, \theta$ b) $1, \rho, 1$ c) $1, \rho, \sin\theta$ d) $1, \rho, z$

6) The curl of a vector $\overline{V}$ is the _____ line integral of the vector field per unit area.
   a) maximum   b) minimum   c) constant   d) zero

7) $\overline{a} \cdot (\overline{b} \times \overline{a}) =$
   a) 1   b) a^2 c) 0   d) b

P.T.O.

8) For the distribution to be most probable, then
   a) $\omega = 0$
   b) $\log \omega = 0$
   c) $\delta(\log \omega) = 0$
   d) $\dfrac{1}{\log}(\omega) = 0$

9) Boltzmann's partition function z =
   a) $\displaystyle\sum_{i=1}^{K} gi\, e^{\frac{-u_i}{uT}}$
   b) $\displaystyle\sum_{i=1}^{K} gi\, e^{\frac{+u_i}{uT}}$
   c) $\displaystyle\sum_{i=1}^{K} gi\, e^{\frac{-uT}{u_i}}$
   d) $\displaystyle\sum_{i=1}^{K} gi\, e^{-\frac{1}{uT}}$

10) In _____ ways three particles can be arranged in four energy levels.
    a) 4
    b) 10
    c) 8
    d) 12

2. Answer **any five** of the following : **10**

   1) Define macrostates and microstates of a system.

   2) Explain the line integral of a vector field.

   3) Define Fermi energy and occupation index.

   4) Deduce the Rayleigh-Jeans formula from Planck's law of radiation.

   5) Write Laplacian operator ∇^2 in orthogonal curvilinear coordinates.

   6) Draw the M-B distribution curve for the molecular speeds. Locate the positions of V_{mp}, V and V_{rms} on the curve.

3. A) Answer **any two** of the following : **6**
   1) Obtain an expression for gradient of a scalar field.
   2) Explain electronic specific heat.
   3) Obtain an expression for root mean square speed of a gas molecules.

   B) Compare the M-B, B-E and F-D statistics. **4**

4. Answer **any two** of the following : **10**

   1) Explain micro-canonical and canonical ensemble.

   2) Derive thermodynamical functions-internal energy and enthalpy in terms of Boltzmann's partition function.

   3) Obtain Green's symmetrical theorem from Gauss divergence theorem.

5. Answer **any one** of the following : **10**

   1) Obtain an expression for divergence of a vector field in orthogonal curvilinear coordinate system.

   2) Derive Maxwell-Boltzmann's distribution law.

Seat No.	

B.Sc. – III (Semester – V) (Old) Examination, 2016
CHEMISTRY
Physical Chemistry (Special Paper – IX)

Day and Date : Thursday, 31-3-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
      2) Figures to the **right** indicate **full** marks.
      3) **Neat** diagrams must be drawn **whenever** necessary.
      4) **Use** of logarithmic table/calculator is **allowed**.

1. Choose the most correct alternative from **each** of the following and rewrite the sentence. **10**

   1) The number of components for the system $CaCO_{3(S)} \rightleftharpoons CaO_{(S)} + \rightleftharpoons CO_{2(g)}$ are _____

     a) Zero   b) One   c) Two   d) Three

   2) For a system $Ice_{(s)} \rightleftharpoons$ liquid water $\rightleftharpoons$ water vapour, the degree of freedom is _____

     a) Zero   b) One   c) Two   d) Three

   3) Photochemical reactions take place in presence of _____

     a) Light   b) Heat
     c) Electricity   d) None of these

   4) Only the light that is absorbed by the substance is effective in producing a photochemical change. This is known as _____ law.

     a) Avogadro's   b) Einstein's
     c) Beer-Lamberts   d) Grotthus-Draper

   5) Yellow phosphorus oxidises to produce a glow in dark. This process is called _____

     a) Phosphorescence   b) Fluorescence
     c) Chemi luminescence   d) None of these

6) The cell, Pt, $H_{2(g)}|HCl_{(aq)}|AgCl_{(s)}|Ag_{(s)}$ is an example of _____
   a) Chemical cell with transference
   b) Chemical cell without transference
   c) Concentration cell with transference
   d) Concentration cell without transference

7) The standard electrode potential of hydrogen electrode is _____
   a) 0.0 volt   b) 1.1. volts   c) 0.11 volt   d) 2.2 volts

8) The electrolyte which can be used in the preparation of salt bridge is _____
   a) KOH   b) KCl   c) NaOH   d) NaCl

9) The electrode at which reduction occurs is called _____
   a) Anode   b) Cathode
   c) Null electrode   d) None of these

10) The equation, $\Delta G = -nE_cF$, represents _____
   a) Maximum work   b) Free energy
   c) Both a) and b)   d) Electrical work

2. Answer **any five** of the following :   **10**
   1) Define the terms :
      a) True equilibria
      b) Metastable equilibria.
   2) What is chemiluminescence ? Explain with one example.
   3) Define the terms :
      a) Phase
      b) Number of components.
   4) Write electrode reaction and expression for potential of the following electrode :
      $Cl^-_{(aq.)}, AgCl_{(s)}|Ag_{(s)}$.
   5) What are concentration cells ? Give different types of concentration cell.
   6) Write electrode reaction and expression for the potential of the following electrode :
      $Cl^-_{(aq)}|Cl_{2(g)}, Pt$.

3. A) Answer **any two** of the following :　　　　　　　　　　**6**

   1) Write note on "Reversible cells".

   2) State and explain Einstein's law of photochemical equivalence.

   3) State Gibb's phase rule and explain the term degree of freedom involved in it.

   B) Emf of the cell :　　　　　　　　　　　　　　　　　　**4**

   $Pt, H_{2(g)}, | H^+_{(aq.)} || SCE$

   　　　$P=1 atm.p$
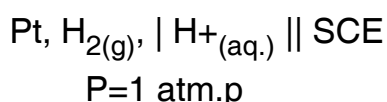
   is 0.362 volt at 298 K. Find the pH of the solution.

   Given : $E^O_{SCE} = 0.241$ volt.

4. Answer **any two** of the following :　　　　　　　　　　**10**

   1) Discuss the application of phase rule to Pb-Ag system.

   2) A substance absorbs 2×10^{16} quanta of radiation per second and 0.002 mole of it reacts in 20 minutes. Calculate quantum yield of this reaction.

   (Given : $N = 6.023 \times 10^{23}$).

   3) Calculate emf of the following cell at 298 K

   $$Zn_{(s)} \left| Zn SO_{4(aq.)} (0.05M) \atop a_1 \right\| \left. Zn SO_{4(aq.)} (0.5M) \atop a_2 \right| Zn(s)$$
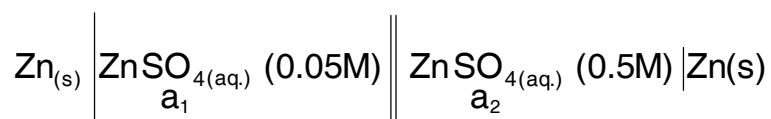
   The degree of dissociation of $ZnSO_4$ in 0.5M solution is 0.14 while that in 0.05M solution is 0.35 liquid-liquid junction potential is neglected.

   (Given : $\dfrac{2.303\,RT}{F} = 0.0591$).

5. Answer **any two** of the following :　　　　　　　　　　**10**

   1) Derive an expression for emf of an electrode concentration cell without transference which is reversible to cation.

   2) Explain how thermodynamic parameters ΔG, ΔH and ΔS are determined from cell emf.

   3) Discuss with an examples the photosensitized reactions.

   _____

B.Sc. (Part – III) (Semester – V) (Old) Examination, 2016
BOTANY (Special Paper – IX)
Biology of Cryptogams

Day and Date : Thursday, 31-3-2016   Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

N.B. : i) **All** questions are **compulsory**.

ii) **All** questions carry **equal** marks.

iii) Figures to the **right** indicate **full** marks.

iv) Draw **neat** labeled diagrams **wherever** necessary.

1. Rewrite the sentences by choosing correct alternative.   **(10×1=10)**

   1) Chantransea stage is formed by _____ alga.

   a) *Chara*   b) *Ectocarpus*

   c) *Batrachospermum*   d) *Sargassum*

   2) Cyclosis is observed in the cells of

   a) *Sargassum*   b) *Ectocarpus*

   c) *Batrachospermum*   d) *Chara*

   3) Stag head stage is induced by _____ in host plants.

   a) *Uncinula*   b) *Albugo*   c) *Polyporus*   d) *Puccinia*

   4) *Polyporus* belongs to the subdivision

   a) Basidiomycotina   b) Ascomycotina

   c) Deuteromycotina   d) Mastigomycotina

   5) Diplontic type life cycle is dominated by _____ generation.

   a) Gametophytic   b) Sporophytic   c) Triploid   d) Haploid

   6) The sporophyte of *Marchantia* is differentiated in to

   a) Foot   b) Seta   c) Capsule   d) All the above

   7) Nucule is the sex organ of

   a) *Batrachospermum*   b) *Ectocarpus*

   c) *Chara*   d) *Sargassum*

P.T.O.

8) Gemmae bodies are formed by

a) *Marchantia*   b) *Riccia*   c) *Anthoceros*   d) *All the above*

9) Fruiting body of Polyporus is

a) Ascocarp   b) Basidiocarp   c) Cystocarp   d) Pericarp

10) _____ type of sexual reproduction in algae is most advanced.

a) Isogamous   b) Anisogamous

c) Oogamous   d) All the above

2. Answer **any five** of the following :   **(5×2=10)**

i) Classify *Albugo* giving reasons.

ii) Define halobiontic life cycle.

iii) Sketch and label the HLS of sporocarp of *Marsilea*.

iv) State the economic importance of *Polyporus*.

v) State the names of edible mushrooms.

vi) Give the multi cellular forms of algae.

3. A) Answer **any two** of the following :   **(2×3=6)**

i) Describe the haplontic type life cycle in algae.

ii) Describe the evolution of sex in algae.

iii) Describe the synangium of *Psilotum.*

B) Describe the sporophyte of *Marchantia*.   **4**

4. Answer **any two** of the following :   **(2×5=10)**

i) Describe in brief the fresh water forms of algae.

ii) Describe the asexual reproduction in *Ectocarpus*.

iii) Describe the advanced sporophyte of Bryophyte as per upgrade evolution.

5. Answer **any two** of the following :   **(2×5=10)**

i) Describe the carposporophyte of *Batrachospermum*.

ii) Describe the asexual reprodction in Albugs.

iii) Describe the types of sori in pteridophytes.

_____

SLR-W – 201

B.Sc. III (Semester – V) (Old) Examination, 2016
MATHEMATICS (Special Paper – IX)
Real Analysis

Day and Date : Thursday, 31-3-2016　　　　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

> **Instructions** : i) **All** questions are **compulsory**.
> ii) *Figures to the **right** indicates **full** marks.*

1. Select the correct alternative for **each** of the following : **10**

　1) The sequence $\{r^n\}_{n=1}^{\infty}$ converges to zero if

　　a) $|r| > 1$　　　　b) $|r| < 1$　　　　c) $|r| = 1$　　　　d) $r = \infty$

　2) Every monotonic increasing sequence which is not bounded above diverges to

　　a) ∞　　　　　　　　　　　　　b) $-\infty$

　　c) Both ∞ and $-\infty$　　　　　d) None of these

　3) The set of all rational number is

　　a) Countable　　b) Uncountable　　c) Denumerable　d) None of these

　4) For $f : R \to R$ and $g : R \to R$, if $f(x) = 3x - 1$ and $g(x) = x^2 + 1$ then

　　a) $f \circ g = g \circ f$　　b) $f \circ g \neq g \circ f$　　c) $f \circ f = g \circ g$　　d) None of these

　5) For the sequence 1, –4, 7, –10, 13, ... which of the following is not a subsequence ?

　　a) (7, –4, 13, –10, ...)　　　　　　b) (1, 7, 13, ...)

　　c) (–4, –10, –16, ...)　　　　　　d) None of these

　6) If $f : R \to (0, \infty)$ defined by $f(x) = e^x$, then the function (x, e^x) is

　　a) f is into　　　　　　　　　　　b) f is one to one

　　c) f is many one into　　　　　　d) None of the above

　7) If $\sum a_n$ is convergent series then $\lim\limits_{n \to \infty} a_n$ is equal to

　　a) 1　　　　　　b) 0　　　　　　c) ∞　　　　　d) None of these

8) The series $1 - \dfrac{1}{2} + \dfrac{1}{2} - \dfrac{1}{4} + \dfrac{1}{3} - \dfrac{1}{8} + \dfrac{1}{4} - \dfrac{1}{16} + \dots$ is

    a) convergent   b) divergent   c) oscillatory   d) none of these

9) If $\sum a_n$ is an absolutely convergent series and (b_n) is bounded sequence then

    $\sum a_n b_n$ is

    a) absolutely convergent

    b) conditionally convergent

    c) both a) and b)

    d) none of these

10) If $\sum a_n$ is a series of non-zero real number and let $a = \lim\limits_{n \to \infty} \inf \left| \dfrac{a_{n+1}}{a_n} \right|$ and

    $A = \lim\limits_{n \to \infty} \sup \left| \dfrac{a_{n+1}}{a_n} \right|$ if $a > 1$ then $\sum a_n$ is

    a) convergent   b) divergent

    c) both a) and b)   d) none of these

2. Attempt **any five** of the following :   **10**

    1) Using Cauchy's condensation test prove that $\sum\limits_{n=1}^{\infty} \dfrac{1}{n}$ is divergent.

    2) Show that the sequence $\dfrac{1}{1.2} + \dfrac{1}{2.3} + \dfrac{1}{3.4} + \dots$ is monotonic increasing.

    3) If $0 < x < 1$ then show that $\sum\limits_{n=0}^{\infty} x^n$ converges to $\dfrac{1}{1-x}$.

    4) If $\lim\limits_{n \to \infty} s_n = L$ and $\lim\limits_{n \to \infty} t_n = M$ then prove that $\lim\limits_{n \to \infty} (s_n - t_n) = L - M$.

    5) If A and B are subset of S then prove that $(A \cap B)' \subseteq A' \cup B'$.

    6) If the function $f(x) = -\log x$ for $x \in (0, \infty)$. If $A = [0, 1]$ and $B = [1, 3]$ find

       i) $f^{-1}(B)$ and

       ii) $f^{-1}(A \cup B)$.

3. A) Attempt **any two** of the following :   **6**

    1) If the sequence of real numbers $\{s_n\}_{n=1}^{\infty}$ is convergent then prove that it is bounded.

    2) If $0 < a_n \le c_n$ for every $n \ge m$; $m \in N$, prove that if Σc_n converges then Σa_n converges.

    3) If the function $f(x) = x^2$ for $x \in [0, \infty)$. Find the value of i) $f^{-1}(16)$ ii) $f[0, 4]$ iii) $f^{-1}[(y / 25 \le y \le 36)]$.

  B) If A_1, A_2, A_3.... are countable sets then prove that $\bigcup\limits_{n=1}^{\infty} A_n$ is countable.   **4**

4. Attempt **any two** of the following :   **10**

    1) For any a, b $\in$ R prove that $||a| - |b|| \le |a - b|$. Hence prove that $\{|s_n|\}_{n=1}^{\infty}$ converges to $|L|$ if $\{s_n\}_{n=1}^{\infty}$ converges to L.

    2) If A and B are countable sets then prove that A × B is countable.

    3) If $s = (s_n)$ and $t = (t_n)$ are in l^2 then prove that $\sum\limits_{n=1}^{\infty} s_n t_n$ is absolutely convergent

    and $\left| \sum\limits_{n=1}^{\infty} s_n t_n \right| \le \left(\sum\limits_{n=1}^{\infty} s_n^2 \right)^{1/2} \left(\sum\limits_{n=1}^{\infty} t_n^2 \right)^{1/2}$.

5. Attempt **any two** of the following :   **10**

    1) If f : A → B and X $\subset$ B, Y $\subset$ B then prove that $f^{-1}(X \cup Y) = f^{-1}(X) \cup f^{-1}(Y)$.

    2) For each n $\in$ N, let $I_n = [a_n, b_n]$ be non-empty closed bounded intervals of real numbers such that

      a) $I_1 \supset I_2 \supset I_3 \supset ....\supset I_n \supset I_{n+1} \supset$ ... and

      b) $\lim\limits_{n\to\infty} (b_n - a_n) = 0$ then prove that $\bigcap\limits_{n=1}^{\infty} I_n$ contains precisely one point.

    3) If $\{a_n\}_{n=1}^{\infty}$ is non-increasing sequence of positive number and if $\sum\limits_{n=0}^{\infty} 2^n a_{2^n}$

    converges then prove that $\sum\limits_{n=1}^{\infty} a_n$ converges.

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Seat
No.

B.Sc. (Part – III) (Semester – V) Examination, 2016
STATISTICS (Special Paper – IX) (Old)
Statistical Inference – I

Day and Date : Thursday, 31-3-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) *Figures to the* **right** *indicate* **full** *marks.*

1. Multiple choice questions. Choose the correct alternative :   **10**

   i) Sample characteristic is a
   a) Parameter   b) Statistic
   c) Both a) and b)   d) None of these

   ii) Function of sample observations is called
   a) Statistic   b) Estimator
   c) Both a) and b)   d) None of these

   iii) Unbiasedness is a property associated with
   a) Small samples   b) Large samples
   c) Both a) and b)   d) None of these

   iv) The sufficient statistic for σ^2 of $N(0, \sigma^2)$ is
   a) $\left(\sum x_i\right)^2$ b) $\sum x_i$ c) $\sum x_i^2$ d) $\sum x_i^2 / n$

   v) For a parameter θ, the estimator T is more efficient than any other estimator T^1 if
   a) $V(T) < V(T^1)$ b) $\dfrac{V(T)}{V(T^1)} < 1$

   c) $\dfrac{V(T^1)}{V(T)} > 1$ d) All the above

   vi) If an estimator T_n converges to θ as $n \to \infty$, it is said to be
   a) Unbiased   b) Efficient   c) Sufficient   d) Consistent

P.T.O.

vii) Cramer – Rao inequality is based on
   a) Stringent conditions
   b) Mild conditions
   c) No conditions
   d) None of the above

viii) A sufficient statistic S is said to be complete for θ if
   a) $E_\theta(S) = 0 \Rightarrow S = 0$
   b) $E_\theta(S) = 1 \Rightarrow S = 1$
   c) Both a) and b)
   d) None of the above

ix) The MLE of θ of $N(0, \theta^2)$ is
   a) $\sqrt{\sum X_i^2}/n$
   b) $\sqrt{\sum X_i^2/n}$
   c) $\sum X_i^2/n$
   d) $\sum X_i/n$

x) The moment estimator of λ in $P(\lambda)$ is
   a) $\sum X_i$
   b) $\sum X_i/n$
   c) $\sum X_i^2$
   d) $\sum X_i^2/n$

2. Answer **any five** of the following :   **10**
   i) Giving an example, define a parameter and parameter space.
   ii) Define an estimator giving two examples.
   iii) Distinguish between an estimator and estimate.
   iv) Define an unbiased estimator giving an example.
   v) Define relative efficiency of an estimator T_1 w.r.t. T_2.
   vi) Define a consistent estimator.

3. A) Answer **any two** of the following :   **6**
      i) Explain the general problem of estimation of parameters.
      ii) Show that sample variance is a biased estimator of population variance.
      iii) Prove that a biased estimator is consistent if its bias and variance both tend to zero as the sample size tends to infinity.

   B) Let X_1, X_2 be i.i.d. random variables with Poisson distribution $P(\lambda)$. Show that $T = X_1 + X_2$ is a sufficient estimator for λ.   **4**

4. Answer **any two** of the following :　　　　　　　　　　　　　　　　　**10**

　i) Prove that two distinct unbiased estimators of $\phi(\theta)$ give rise to infinitely many unbiased estimators of $\phi(\theta)$.

　ii) If $I(\theta)$ is the information function of θ of a distribution, show that

$$I(\theta) = -E\left[\frac{\partial^2 \log f}{\partial \theta^2}\right],$$ where $f = f(x, \theta)$ is the p.d.f. of the random variable X.

　iii) Let $X_1, X_2, ..., X_n$ be a random sample from $N(\mu, \sigma^2)$ distribution, σ^2 known. Find Fisher information function $I(\mu)$.

5. Answer **any two** of the following :　　　　　　　　　　　　　　　　　**10**

　i) Let $X_1, X_2, ..., X_n$ be a random sample from $f(x, \theta) = \frac{1}{\theta}e^{-x/\theta}$, $x > 0$. Show that the Cramer – Rao lower bound for the variance of an unbiased estimator of θ is θ^2/n.

　ii) A random sample of size n is drawn from $B(1, p)$ distribution. Obtain the maximum likelihood estimator of p and find its variance.

　iii) Let $X_1, X_2, ..., X_n$ be a random sample from $P(x, \theta) = \theta^x (1 - \theta)$, $X = 0, 1, 2, ...$ Find the moment estimator of θ.

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Seat
No.

B.Sc. – III (Semester – V) (Old) Examination, 2016
MICROBIOLOGY (Special Paper – IX)
Virology, Extremophiles and Bioinformatics

Day and Date : Thursday, 31-3-2016   Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

Instructions :   1) **All** questions are **compulsory**.

2) Figures to **right** indicate **full** marks.

1. Rewrite the sentences after choosing correct answer from the given alternatives : **10**

1) λ phage contains _____ as its genetic material.
   a) DS linear DNA   b) DS linear RNA
   c) DS circular DNA   d) None of the above

2) Multiplication of influenza virus occurs in
   a) Cytoplasm   b) Nucleus   c) Mitochondria   d) Ribosome

3) _____ lambda phage gene is responsible for the lysogenic state.
   a) Q   b) A   c) R   d) C1

4) _____ is temperate phage.
   a) mu   b) T4   c) T3   d) OX174

5) Polystyrene latex is used for enumeration of viruses in sample by
   a) Pock method   b) Hemagglutation assay
   c) Acid end point method   d) Direct microscopic count

6) In _____ tissue cells do not invade surrounding tissues only remain localised as a compact mass.
   a) Non-malignant tumors   b) Malignant tumors
   c) Malignant wart   d) Cancer

7) _____ is a repository for 3-D structural data of large biological molecules.
   a) Gen Bank   b) PDB   c) MEDLINE   d) OMOM

P.T.O.

8) _____ organism can grow at temperature range 70° C-100° C at pH-6.
   a) Desulfococcus   b) *Thermotoga maritima*
   c) Methanomonas   d) Sulfolobus

9) *Vibrio cholera* is _____ organism.
   a) Acidophilic   b) Alkophilic   c) Neutral   d) Psychrophilic

10) The naturally occurring alkaline environment on earth is
    a) Hot spring   b) Deep ocean   c) Soda lake   d) Deep wells

2. Answer **any five** of the following :   **10**

   i) Explain Halophilic organisms.

   ii) What is DDBJ ?

   iii) Define malignant warts.

   iv) Define horizontal transmission process in animal viruses.

   v) Explain contact inhibition phenomenon.

   vi) Define Hyperthermophiles.

   vii) What is Eclipse period ?

3. A) Answer **any two** of the following :   **6**

   a) Describe briefly embryonated eggs in study of viruses.

   b) Discuss in detail the reproduction in lysogenic Bacteriophages.

   c) Briefly explain replication of genetic material of influenza virus.

   B) Discuss briefly bioinformatics and its biological applications.   **4**

4. Answer **any two** of the following :   **10**

   i) Explain in detail different theories of oncogenesis.

   ii) Briefly explain the LHT system of viral classification.

   iii) Give the detailed account of characteristics of cancerous cells.

5. Write in short on **any two** of the following :   **10**

   i) Explain in detail one step growth experiment.

   ii) Give the detailed account of extremophiles.

   iii) Describe briefly methods used for enumeration of viruses.

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Seat No.

B.Sc. (Part – III) (Semester – V) (Old) Examination, 2016
PHYSICS (Special Paper – X)
Solid State Physics

Day and Date : Friday, 1-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
               2) Figures to the **right** indicate **full** marks.
               3) **Neat** diagrams must be drawn **whenever** necessary.
               4) **Use** of log table and calculator is **allowed**.

1. Select the correct alternative :   **10**

   i) In crystalline solid atomic arrangement is
      a) irregular   b) random   c) regular   d) zigzag

   ii) Co-ordination number of BCC crystal structure is
      a) 6   b) 8   c) 12   d) 14

   iii) Diffraction of X-rays from the crystal is the phenomenon of
      a) refraction   b) reflection   c) interference   d) scattering

   iv) The volume of the unit cell of the reciprocal lattice is
      a) directly proportional to the volume of the unit cell of direct lattice
      b) inversely proportional to the volume of the unit cell of direct lattice
      c) equal to the volume of the primitive cell
      d) $\dfrac{1}{8}^{th}$ volume of unit cell of simple cubic

   v) Wiedemann and Franzlaw for all metals ratio K/σ at a given temperature T is
      a) zero   b) constant   c) infinite   d) variable

   vi) If T > 0 and E = EF then F(E) =
      a) 20%   b) 30%   c) 40%   d) 50%

   vii) Hall coefficient of material is measured in
      a) volt.cm/amp.gauss   b) amp.gauss/volt.cm
      c) volt.amp/cm.gauss   d) amp.cm/volt.gauss

viii) Effective mass m* of free electron in the lower half of E-K curve is

    a) 0   b) ∞ c) positive   d) negative

ix) The temperature below which certain materials are _____ is called Neel temperature.

    a) diamagnetic   b) paramagnetic   c) ferromagnetic d) antiferromagnetic

x) If a superconductor is placed in a constant magnetic field, the magnetic lines of force will be

    a) pushed out of the superconductor   b) penetrate the superconductor

    c) concentrate at the centre   d) converted into electric current

2. Attempt **any five** of the following :   **10**

   i) What is primitive cell ?

   ii) What is reciprocal lattice ?

   iii) Define fermi energy level.

   iv) What is Hall effect ?

   v) Draw hysteresis curve of ferromagnetic material.

   vi) What is superconductivity ?

3. A) Attempt **any two** of the following :   **6**

    i) Give the steps to determine Miller indices.

    ii) Prove that reciprocal of reciprocal lattice is the direct lattice.

    iii) For lead crystal of lattice parameter a = 4.93A°, find the spacing of (222) plane.

  B) Draw unit cell of FCC structure and find the number of atoms per unit cell of FCC structure.   **4**

4. Attempt **any two** of the following :   **10**

   i) Write note on Sommerfield's model.

   ii) Distinguish metal, semiconductor and insulator on the basis of band theory of solid.

   iii) Write a note on Type I and Type II superconductor.

5. Attempt **any one** of the following :   **10**

   i) What is Bravais lattice ? Explain detail seven crystal system in 3D Bravais lattice.

   ii) Explain Kronig Penny model of crystal.

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Seat
No.

B.Sc. – III (Semester – V) (Old) Examination, 2016
CHEMISTRY (Special Paper No. – X)
Inorganic Chemistry

Day and Date : Friday, 1-4-2016   Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.

           2) Draw **neat** diagram and give equations **wherever** necessary.

           3) Figures to the **right** indicate **full** marks.

1. Select the most correct alternative for the following and rewrite the sentences :   **10**

   1) The CFSE is maximum for _____ transition metal ions.

     a) 5d   b) 4d

     c) 3d   d) none of these

   2) According to MOT, $[Ni(NH_3)_6]^{2+}$ is paramagnetic with _____ unpaired electrons.

     a) one   b) two

     c) three   d) zero

   3) In tracer technique C^{14} is used for

     a) NMR   b) Complex formation

     c) Age determination   d) All of these

   4) There is uncontrolled chain reaction in

     a) fusion reaction   b) chemical reaction

     c) polymerisation   d) atomic bomb

   5) Myoglobin consists _____ heme units.

     a) one   b) two

     c) three   d) four

6) If degree of polymerisation is above 100, then it is known as _____ polymer.

   a) high   b) low

   c) normal   d) organic

7) _____ is the study of controlling of matter on the atomic and molecular scale.

   a) Bio-technology   b) Nano-technology

   c) Nuclear technology   d) All of these

8) In molecular orbital diagrams, electrons presents in bonding molecular orbitals are _____ electrons.

   a) metal   b) ligand

   c) metal and ligand   d) none

9) Sodium pump transport _____ ions into the cell.

   a) sodium   b) calcium

   c) potassium   d) magnesium

10) For dimer, degree of polymerisation is

   a) one   b) two

   c) three   d) four

2. Answer **any five** of the following :   **10**

   a) Draw neat labelled diagram showing splitting of 'd' orbitals in octahedral complex.

   b) Distinguish between chemical reactions and nuclear reactions.

   c) Define monomer and copolymer.

   d) Write the important properties of nanomaterials.

   e) Define artificial transmutation with suitable example.

   f) Draw the structure of heme unit.

3. A) Answer **any two** of the following : **6**

   i) Define CFSE. Calculate CFSE for strong field and weak field complex with d^6 configuration in terms of 10Dq.

   ii) How will you classify polymers ?

   iii) Discuss the binding ability of haemoglobin and myoglobin at different oxygen concentration.

  B) Give the brief account of nuclear fission reactions. **4**

4. Write a note on **any two** : **10**

   i) Fast breeder reactor

   ii) MO diagram of $[TiCH_2O)_6]^{3+}$ ion

   iii) Classification of polymer backbone.

5. Answer **any two** of the following : **10**

   i) Which are essential elements for biological processes ? Explain the role of calcium in muscle contraction.

   ii) What are different applications of radio isotopes as a tracers ? Explain in detail structural determination of PCl_5

   iii) What are the merits and demerits of CFT ?

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Seat No.

B.Sc. – III (Semester – V) Examination, 2016
BOTANY (Special Paper – X) (Old)
Gymnosperms and Palaeobotany

Day and Date : Friday, 1-4-2016
Time : 2.30 p.m. to 4.30 p.m.   Max. Marks : 50

Instructions : i) ***All*** questions are ***compulsory***.
ii) ***All*** questions carry ***equal*** marks.
iii) Draw ***neat*** labelled diagrams ***wherever*** necessary.
iv) Figures to the ***right*** indicate ***full*** marks.

1. Rewrite the following sentences by choosing correct alternative.   **(1×10=10)**

   1) <u>Zamia</u> belongs to class
      a) Cycadopsida   b) Coniferopsida   c) Gnetopsida   d) Coniferoales

   2) The motile sperms of <u>Zamia</u> are
      a) Circular   b) Elongated   c) Triangular   d) Pear snaped

   3) The foliage leaves of <u>Gnetum</u> are
      a) Pinnately compound   b) Palmate
      c) Simple opposite   d) Needle like

   4) T.S. of young stem of <u>Gnetum</u> shows a ring of conjoint, collateral and _____ vascular bundles.
      a) Exarch   b) Mesarch   c) Endarch   d) None of these

   5) The _____ era is regarded as the 'Era of Angiosperm'.
      a) Palaeozoic   b) Mesozoic   c) Coenozoic   d) None of these

   6) Ordovician is included under _____ era.
      a) Palaeozoic   b) Mesozoic   c) Coenozoic   d) Precambrian

   7) In _____ the leaves were needle like.
      a) <u>Annularia</u>   b) <u>Lobatannularia</u>   c) <u>Asterophyllites</u> d) <u>Astromeylon</u>

P.T.O.

8) The flower of <u>cycadeoidea dacotensis</u> is
   a) Unisexual   b) Bisexual   c) Polygamous   d) None of these

9) The seed of <u>Lagenostoma</u> was
   a) Orthotropous   b) Hemianatropous
   c) Anatropous   d) Campylotropous

10) The <u>Enigmocarpon</u> was described by
   a) Prof. Birbal Sahni   b) Shukla
   c) Oliver   d) Deshpande

2. Answer **any five** of the following :   **10**

   i) Give systematic position in <u>Zamia</u>.

   ii) Enlist any two economic importance of <u>Gnetum</u>.

   iii) Define fossilization.

   iv) Enlist any two periods of 'Mesozoic Era'.

   v) Any two characters of family Lyginopteridaceae.

   vi) <u>Annularia</u>.

3. A) Answer **any two** of the following :   **6**

   i) Describe T.S. of <u>Zamia</u> stem.

   ii) Describe Impression.

   iii) Describe 'Coenozoic Era'.

   B) Describe petrification.   **4**

4. Answer **any two** of the following :   **10**

   i) <u>Enigmocarpon</u>.

   ii) T.S. of <u>Lyginopteris oldhamia stem</u>.

   iii) Origin of coal.

5. Answer **any two** of the following :   **10**

   i) Describe carbon dating.

   ii) Describe palaeostachys.

   iii) Describe T.S. of <u>cycadeoidea</u> stem.

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SLR-W-211

Seat No.	

B.Sc. – III (Semester – V) (Old) Examination, 2016
MATHEMATICS (Special Paper – X)
Abstract Algebra

Day and Date : Friday, 1-4-2016   Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

N.B. : 1) **All** questions are **compulsory**.

2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative of the following :   **10**

   1) Let p and q are distinct prime numbers then the number of generators of cyclic group z_{pq} are _____

     a) $(p – 1)(q – 1)$ b) $(p – 1)q$ c) pq d) p^2q^2

   2) An onto homomorphism of G to G′ is called

     a) Monomorphism   b) Epimorphism

     c) Endomorphism   d) Automorphism

   3) Which set satisfy equivalence relation with underlined relation ?

     a) Set of parallel lines   b) Set of perpendicular lines

     c) Set of inclined lines   d) None of these

   4) Alternating group is of order _____

     a) $\left(\dfrac{n}{2}\right)!$ b) $\dfrac{n!}{2}$ c) $n!$ d) $\dfrac{(n – 1)!}{2}$

   5) A sub-group N of a group G is normal if for $n \in N$, $g \in G$ _____

     a) $gng^{-1} \in N$ b) $ngn^{-1} \in N$

     c) $n^{-1}gn \in N$ d) $gng^{-1} \in G$

6) The generators of cyclic group Z_4 are

    a) {1, 3}   b) { 2, 4}

    c) {0, 1, 2}   d) {0, 1}

7) The characteristic of the ring 6Z is

    a) 0   b) 2   c) 3   d) 6

8) Which of the following is true ?

    a) Field C integral domain C ring

    b) Integral domain C field C ring

    c) Ring C integral domain C field

    d) None of these

9) If F is field then it has _____ ideals.

    a) 2   b) 1   c) 3   d) 4

10) Consider the following two statements :

    i) If S is an ideal of ring R then S is also subring of R

    ii) If S is subring of R then S is an ideal of R, then

    a) Only i) is true

    b) Only ii) is true

    c) Both i) and ii) are true

    d) Both i) and ii) are false

2. Attempt **any five** :   **10**

1) If $a \in G$ then prove that $(a^{-1})^{-1} = a$.

2) If G and G′ be isomorphic groups and G is abelian then prove that G′ is also abelian.

3) Define : $\theta : z \to z$ by $\theta(a) = 2a \ \forall a \in Z$ then prove that θ is homomorphism w.r.to addition.

4) Show that every quotient group of cyclic group is cyclic.

5) Define integral domain and give an example of integral domain which is not a field.

6) Define the characteristic of the ring R.

3. A) Attempt **any two** of the following : **6**

    1) Let G be a permutation group on S and ~ is a relation on S defined by a ~ b iff $\alpha(a) = b$ for some $\alpha \in G$ then prove that ~ is an equivalence relation on S.

    2) Show that the intersection of two left ideal of ring is again a left ideal of ring.

    3) If G and H are groups and $\theta : G \rightarrow H$ is a homomorphism then prove that Ker θ is normal subgroup of G.

  B) Prove that every subgroup of a cyclic group is a cyclic. **4**

4. Attempt **any two** : **10**

    1) Prove that every finite integral domain is field.

    2) Prove that normaliser of a i.e. N(a) is a subgroup of G where $a \in G$.

    3) If H is finite subgroup of group G and $a \in G$ then prove that $| H | = | Ha|$.

5. Attempt **any one** of the following : **10**

    1) State and prove fundamental theorem of group homomorphism.

    2) Let p be prime number then prove that the set of integers $I_P = \{0, 1, 2, ... p-1\}$ forms a field w.r.to addition and multiplication modulo p.

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SLR-W – 212

Seat No.	

B.Sc. (Part – III) (Semester – V) (Old) Examination, 2016
STATISTICS
Sampling Techniques (Special Paper – X)

Day and Date : Friday, 1-4-2016
Time : 2.30 p.m. to 4.30 p.m.

Max. Marks : 50

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Soundless calculators are **allowed**.

1. Choose most appropriate alternative from those given in each case : **10**

   i) The number of possible samples of size 'n' from a population of 'N' units with replacement is

   a) $\binom{N}{n}$ b) N^n c) $n!$ d) none of these

   ii) Probability of drawing a unit at each selection remain same in

   a) Simple random sampling without replacement
   b) Simple random sampling with replacement
   c) Both (a) and (b)
   d) None of the above

   iii) Simple random sample can be drawn with the help of

   a) random number tables   b) chit method
   c) roulette wheel   d) all the above

   iv) Stratified sampling comes under the category of

   a) unrestricted sampling   b) subjective sampling
   c) purposive sampling   d) restricted sampling

   v) Which one of the following problem is not related to stratified sampling ?

   a) fixing the criterion for stratification
   b) fixing the number of strata
   c) fixing the sample size
   d) none of these

vi) Under proportional allocation, the size of the sample from each stratum depends on
   a) total sample size
   b) size of the stratum
   c) population size
   d) all of these

vii) Selected units of a systematic sample are
   a) not easily locatable
   b) easily locatable
   c) not representing the whole population
   d) all of these

viii) Which of the following situations cluster sampling is appropriate ?
   a) When the units are far apart
   b) When sampling frame is not available
   c) When all the elementary unit are not easily identifiable
   d) All of these

ix) A population is divided into clusters and it has been found that all items within a cluster are alike. Which sampling methods you adopt ?
   a) cluster sampling
   b) stratified sampling
   c) simple random sampling
   d) systematic sampling

x) The errors emerging out of faulty planning of surveys are categorised as
   a) non sampling errors
   b) non response errors
   c) sampling errors
   d) none of these

2. Attempt **any five** from the following : **10**

   i) Explain sampling frame.

   ii) Concept of sampling errors.

   iii) Explain dichotomous attributes.

   iv) Give real life situations where stratified random sampling is used.

   v) Give idea of circular systematic sampling.

   vi) Explain two stage sampling.

3. A) Answer **any two** of the following : **6**
   i) Give objectives of sample survey.
   ii) Describe non sampling errors.
   iii) Concept of auxiliary variable and its use in estimation.

   B) Describe the technique of drawing a sample using systematic sampling. **4**

4. Attempt **any two** of the following : **10**
   i) Obtain an unbiased estimator of the population mean and find its variance in case of stratified random sampling.

   ii) Describe sampling for proportion. Show that sampling proportion is unbiased estimator of population proportion.

   iii) Find relative efficiency of ratio estimators with that of simple random sampling without replacement.

5. Answer **any two** of the following : **10**
   i) Explain cluster sampling. Obtain an unbiased estimator for population mean and population total.

   ii) Describe regression method of estimation of population mean. Obtain its relative efficiency with that of simple random sampling without replacement.

   iii) Explain proportional allocation and optimum allocation. Obtain Neyman's formula for optimum allocation.

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Seat No.

B.Sc. – III (Semester – V) (Old) Examination, 2016
GEOLOGY (Special Paper – X)
Geomorphology

Day and Date : Friday, 1-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** labelled diagrams **wherever** necessary.

1. Fill in the blanks with correct answer from given options.   **10**

   1) Which one of the following is the correct combination of ideal slope from top to bottom ?
      a) Convex-free face-rectilinear element-Concave element
      b) Rectilinear element-Convex-free face-Concave element
      c) Rectilinear element-free face-Convex-Concave element
      d) Convex-free face-Concave element-rectilinear element

   2) Ox-bow lakes are generally associated with _____ stage of stream.
      a) Youth   b) Mature
      c) Old   d) Can occur at all ages

   3) "Present is the key to the past" is the principle of _____
      a) Uniformitarianism   b) Faunal succession
      c) Order of superposition   d) None

   4) A point where river rejuvenate is known as _____ point.
      a) summit   b) head   c) nick   d) kick

   5) The landscape of Messa and Butte formed is formed by presence of _____ strata beneath.
      a) Horizontal   b) Inclined   c) Folded   d) Faulted

   6) Which one of the following is exogenetic process ?
      a) Earthquake   b) Volcano   c) Deposition d) None of these

7) Radial drainage pattern indicates presence of _____
   a) fold   b) dome   c) fault   d) none of these

8) A high land between two streams is known as _____
   a) point bars   b) spits   c) substracts   d) divide

9) No major river can erode vertically beyond _____
   a) mean sea level   b) local base level
   c) valley floor   d) interfluve

10) Valley in valley feature is also known as _____.
    a) valley floor   b) hanging valley
    c) valley in old stage   d) river terraces

2. Answer **any five** of the following :   **10**
   i) What is absolute relief ?
   ii) Define landslide.
   iii) What is base level of erosion ?
   iv) What are the causes of static rejuvenation ?
   v) At which stage of river a feature of river captures occur ?
   vi) What is tectonic slope ?

3. A) Answer **any two** of the following :   **6**
   i) How the landscape of exfoliation domes are formed ?
   ii) What is rotational sliding ?
   iii) What causes subsidence ?

   B) Explain any four preventive measures for mass movement.   **4**

4. Answer **any two** of the following :   **10**
   i) What are characters of mature stage in cycle of erosion ?
   ii) Describe classification of slope based on slope angles.
   iii) Explain how composition of mass affects the mass movement.

5. Answer **any two** of the following :   **10**
   i) Explain slow flowage and rapid flowage.
   ii) What are topographic expressions of rejuvenation ?
   iii) Explain in detail the role of gravity in mass movement.

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Seat
No.

B.Sc. – III (Semester – V) Examination, 2016
INDUSTRIAL MICROBIOLOGY (Old) (Special Paper – X)
Industrial Microbiology

Day and Date : 1-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N. B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) **Draw** neat labelled **diagrams**.

1. Rewrite the following sentences by choosing correct alternative :   **10**

   1) The pH value of acidic food is in the range of _____

      a) 7-9   b) 1-2   c) 4-5   d) 9-11

   2) Yogurt is a _____ product.

      a) Dairy   b) Textile   c) Pharmaceutical d) Bakery

   3) The raw materials used for making Idli include rice and _____

      a) Lentil   b) Wheat   c) Jowar   d) Urad dal

   4) A sweet taste to wine is due to presence of _____ sugar in grapes.

      a) Sucrose   b) Fructose   c) Lactose   d) Galactose

   5) The concentration of alcohol in lager beer is _____

      a) 5.0%   b) 12%   c) 20%   d) 15%

   6) Sham test is a preliminary test for _____

      a) Allergen   b) Carcinogen   c) Pyrogen   d) Mutagen

   7) In cross flow filtration the flow rate is kept _____ to the filter surface.

      a) Perpendicular b) Tangential c) Parallel   d) In line

   8) _____ is used in jams. Ice creams as a thickner.

      a) Glucan   b) Glycan   c) Xylan   d) Dextran

P.T.O.

9) The first step of downstream processing removes _____

   a) Product   b) Solubles   c) Insolubles   d) Liquid

10) Crystallization is usually done for the recovery of _____ product.

   a) Antibiotic   b) Organic acid c) Alcohol   d) Whole cells

2. Write in short **(any five)** :   **10**

   i) Write names of organisms responsible for Idli fermentation.

   ii) Define wine.

   iii) What is malting ?

   iv) Write on uses of dextran.

   v) What is GMP ?

   vi) What is cheddaring ?

3. A) Write in short **(any two)** :   **6**

   i) Write on curd as fermented dairy product.

   ii) Draw flow chart of red wine production.

   iii) Describe Ames test.

   B) Describe production of Interferon as rDNA product.   **4**

4. Write on **(any two)** :   **10**

   i) Write on whole broth processing.

   ii) Write on defects of wine.

   iii) Describe distillation process for recovery.

5. Answer **any two** of the following :   **10**

   i) Describe process of white wine production.

   ii) Describe sterility test as quality control.

   iii) Write on good manufacturing practices.

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Seat No.	

B.Sc. III (Semester – V) Examination, 2016
PHYSICS (Special Paper – XI) (Old)
Classical Mechanics and Spectroscopy

Day and Date : Saturday, 2-4-2016   Max.Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) *All questions are compulsory.*
        2) *Figures to the **right** indicate **full** marks.*
        3) ***Neat** diagram must be drawn **wherever** necessary.*
        4) ***Calculator** or log table is **allowed**.*

1. Select correct alternative.   **10**

   i) The principle of virtual work deals only with cases of

      a) Statics   b) Dynamics   c) Kinematics   d) Kinetics

   ii) The principle of virtual work is expressed by the equation

      a) $\sum_i \vec{F_i} \cdot \vec{Sr_i} = 0$ b) $\sum_i \overset{(a)}{Fi} . \vec{Sr_i} = 0$

      c) $\sum_i \vec{f_i} \cdot \vec{Sr_i} = 0$ d) $\sum_i (F_i - \dot{P_i}) Sr_i = 0$

   iii) Elements with configuration ns' for last orbit are called

      a) alkali metals   b) halogens

      c) inert gases   d) alkaline earth metals

   iv) Capacity of a subshell to hold electrons is

      a) $(2l + 1)$ b) $2(2l + 1)$ c) $2n^2$ d) $2(2n + 1)$

v) Similar optical spectra are produced by the elements belonging to

    a) same period   b) same group

    c) same period and group   d) none of these

vi) All frames of reference rotating w.r.t. a fixed frame are

    a) inertial   b) non-inertial

    c) located at a point   d) none of these

vii) According to Newton's second law of motion in fixed frame of reference, F =

    a) ma   b) m/a

    c) a/m   d) $\dfrac{1}{ma}$

viii) In Raman spectra, the spectral lines on higher frequency side are called _____ lines.

    a) Stokes   b) Anti-stokes

    c) Zeeman   d) Paschen- Back

ix) In Hydrogen molecule the spins of two electrons are

    a) parallel   b) antiparallel   c) perpendicular   d) tangential

x) Frank-Condon principle helps in estimating the

    a) intensity of bands   b) width of bands

    c) inter molecular distance   d) resolution of bands

2. Attempt **any five** :   **10**

  i) What is pseudo force ?

  ii) State the types of molecular bond.

  iii) What are stoke's and anti-stokes lines ?

  iv) State conservation theorem of linear momentum.

   v) What is Coriolis force ?

   vi) What is stark effect ?

3. A) Attempt **any two** .   **6**

   i) Write a note on electron spin-orbit interaction.

   ii) What is the nature of wave function of H_2-molecule ?

   iii) State and prove the conservation theorem for angular momentum of a particle.

  B) Write a note on the selections rules for doublet spectra.   **4**

4. Attempt **any two.**   **10**

   i) Obtain Lagrange's equations from D' Alembert's principle.

   ii) Use Lagrange's equations to obtain an expression for acceleration in Atwoods machine.

   iii) Write a note on Frank-Condon principle.

5. Attempt **any one.**   **10**

   i) State and prove conservation theorem for energy of a single particle.

   ii) Obtain an expression for rotational energy of a diatomic molecule and discuss rotational spectra.

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B.Sc. – III (Semester – V) (Old) Examination, 2016
CHEMISTRY
Organic Chemistry (Special Paper – XI)

Day and Date : Saturday, 2-4-2016   Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.

2) Draw **neat** diagrams and give equations **wherever** necessary.

3) Figures to the **right** indicate **full** marks.

4) Spectroscopic data chart supplied by University is **allowed**.

1. Choose the most correct alternative from those given below and rewrite the sentence : **10**

   i) _____ has maximum angle strain.

   a) Cyclohexane   b) Cyclobutane   c) Cyclopropane   d) Cyclopentane

   ii) _____ is an intermediate formed in Hofmann rearrangement.

   a) Carbocation   b) Carbanion

   c) Nitrene   d) Carbene

   iii) _____ is not an active methylene compound.

   a) $CH_3COCH_2COOC_2H_5$ b) $CH_3 – COOC_2H_5$

   c) $CH_2(COOH)_2$ d) $CH_2(CN)_2$

   iv) Which of the following is an active methylene compound ?

   a) $CH_3COCH_2 – CH_2 – COOC_2H_5$ b) $CH_3 – CH_2 – CH_2 – COOC_2H_5$

   c) $H_5C_2OCO – CH_2 – COOC_2H_5$ d) $NC – H_2C – CH_2 – NO_2$

v) _____ has maximum internal angle.

   a) Cyclobutane   b) Cyclohexane

   c) Cyclopropane   d) Cyclopentane

vi) $H_3C - N \begin{smallmatrix} CH_3 \\ CH_3 \end{smallmatrix}$ will give _____ signals in its PMR spectrum.

   a) 1   b) 2   c) 3   d) 4

vii) Number of modes of vibrations for C_6H_6 will be

   a) 12   b) 30   c) 36   d) 9

viii) In mass spectroscopy molecule in bombarded with _____

   a) Radio waves   b) Micro waves

   c) Electron beam   d) UV radiations

ix) 2-butene on addition of bromine to it, gives _____ isomeric products.

   a) 1   b) 2   c) 3   d) 4

x) Vibrational frequency of a bond increases with

   a) increase in bond order

   b) increase in electronegativity of atoms forming bond

   c) decrease in bond length

   d) all the three a, b, c

2. Answers **any five** of the following :   **10**

   i) Define magnetic and nonmagnetic nuclei.

   ii) Define syn and anti elimination reactions.

   iii) Give synthesis of 4-methyl uracil from aceto acetic ester.

   iv) Explain Knoevenagel condensation with suitable example.

   v) State and explain Hooke's law.

   vi) Give advantages of Wittig reaction.

3. A) Answer **any two** of the following : **6**

    i) How many signals are expected in the PMR spectra of following compounds ?

      a) CH_3CH_2COOH

      b) CH_3COCH_3

      c) $CH_3 - CH - CH_3$
                 $|$
                Br

    ii) How will you prepare monoalkyl and dialkyl derivatives of diethyl malonate ?

    iii) Explain shielding effect with the help of suitable examples.

  B) Discuss Bayer strain theory. **4**

4. Answer **any two** of the following : **10**

  i) Complete the following reaction. Suggest mechanism for it and name the reaction.

    $CH_3CONH_2 + Br_2 + 4\,NaOH \rightarrow$?

    Acetamide

  ii) Draw different conformations of cyclohexane and comment on their stability.

  iii) How will you prepare succinic acid and crotonic acid from aceto acetic ester ?

5. Answer **any two** of the following : **10**

  i) State the principle of mass spectroscopy and give its applications.

  ii) Assign the structure to the compound showing following spectral data and name the compound

    a) Molecular formula   : C_4H_8O

    b) M/e   :   72

    c) IR   : $1720\,cm^{-1}$

    d) PMR   :   i) 1.05 δ (t, 3H)

                       ii) 1.10 δ (s, 3H)

                       iii) 2.50 δ (q, 2H)

  iii) Write a short note on theory of strainless rings.

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Seat No.

B.Sc. – III (Semester – V) Examination, 2016
BOTANY
Special Paper – XI : Genetics (Old)

Day and Date : Saturday, 2-4-2016   Total Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.

              2) **All** questions carry **equal** marks.

              3) Draw **neat** diagram **wherever** necessary.

              4) Figure to the **right** indicate **full** marks.

1. Rewrite the sentences choosing correct answer from given alternatives :   **10**

   1) Gamets are never hybrid, this is statement of

     A) Law of segregation   B) Law of dominance

     C) Law of independent assortment   D) Law of random fertilization

   2) In monohybrid cross a typical genotype ratio is

     A) 3 : 1   B) 9 : 7   C) 9 : 3 : 3 : 1   D) 1 : 2 : 1

   3) Monosomy is depicted by

     A) n   B) $n - 1$

     C) $2n - 1$ D) $2n - 2$

   4) Mongolism caused due to trisomy of 21st chromosome of humans is

     A) Down's syndrome   B) Patau's syndrome

     C) Kline Felter syndrome   D) Turner's syndrome

   5) The genes of different traits located on different loci on the same chromosome are

     A) Alleles   B) Linked   C) Pleiomorphic   D) Mutated

   6) Backcross to the recessive parent is known as

     A) Linkage   B) Crossing over

     C) Test cross   D) Reversion

   7) Sex linked characters are

     A) Dominant   B) Recessive   C) Lethal   D) Not inherited

8) Holandric genes located on
   A) X chromosome
   B) Y chromosome
   C) Autosome
   D) None of the above

9) Trisomy is expressed as
   A) 2n + 1
   B) 2n – 1
   C) 2n + 2
   D) 2n – 2

10) Attachment of chromosomal fragment resulting in addition of one or more genes to chromosome is called as
   A) Duplication
   B) Translocation
   C) Inversion
   D) Deletion

2. Write **any five** of the following :　　　　　　　　　　　　　**10**

1) Write characters of haploids.

2) Describe complete linkage with suitable example.

3) What are blood groups in man ?

4) What is back cross ?

5) What is autosome ?

6) Define law of independent assortment.

3. A) Write **any two** of the following :　　　　　　　　　　　　**6**

1) Explain law of dominance with suitable example.

2) Describe mechanism of crossing over.

3) Sex chromosome in Drosophila.

B) Explain mechanism of sex determination in plants.　　　　　**4**

4. Write **any two** of the following :　　　　　　　　　　　　　**10**

1) Describe Hardy-Weinbeg's law.

2) Explain mitochondrial inheritance.

3) Describe inversion with figure.

5. Write **any two** of the following :　　　　　　　　　　　　　**10**

1) Explain Darlington's Breakage and reunion theory.

2) Describe Hemophilia in man.

3) What is Autopolyploidy ? What are different kinds, explain with suitable example.

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Seat
No.

B.Sc. (Part – III) (Semester – V) (Old) Examination, 2016
ZOOLOGY (Special Paper – XI)
Comparative Anatomy of Chordates

Day and Date : Saturday, 2-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4..30 p.m.

Instructions : i) **All** questions are **compulsory**.
　　　　　　　 ii) *Figures to the **right** indicate **full** marks.*
　　　　　　　 iii) **Draw** neat labelled diagrams **wherever** necessary.

1. Select the appropriate answer from **each** of the following and rewrite the
   sentence :   **10**

   1) _____ are special vertebrate present in birds.
      a) Amphicoelous   b) Heterocoelous
      c) Acoelous   d) Procoelous

   2) Focal length of lens of eye regulated by
      a) Iris muscles   b) Pupil
      c) Ciliary muscles   d) Vitreous lumour

   3) Lobi inferiors are present in brain of
      a) Amphibians   b) Reptiles
      c) Elasmobranchs   d) Mammals

   4) Uropygial glands are present in
      a) Fishes   b) Mammals
      c) Birds   d) Amphibians

   5) Systemic arch of adult vertebrates includes _____ aortic arch of
      basic plan.
      a) Second   b) Fifth
      c) Fourth   d) Sixth

   6) Gills of cartilage fishes are described as _____ gills.
      a) Lamelliform   b) A branch
      c) Filiform   d) Demi branch

P.T.O.

7) Horn of rhinocerous is a modification of

   a) Scales   b) Glands   c) Shields   d) Hairs

8) Oily secretion produced by _____ glands keeps the skin soft and leathery in mammals.

   a) Scent   b) Sweat   c) Mucus   d) Sebaceous

9) Heart of _____ show highly reduced sinus venosus.

   a) Cartilage fishes   b) Boney fishes

   c) Amphibians   d) Reptiles

10) _____ have ruminant stomach.

   a) Cat   b) Dogs   c) Monkey   d) Cow

2. Answer **any five** of the following   **10**

1) Mesonephros kidney.

2) Fore gut in birds.

3) Reptilian heart.

4) Synsacrum.

5) Gills of boney fishes.

6) Brain of scoliodon.

3. A) Answer **any two** of the following :   **6**

   i) Describe internal ear of scoliodon.

   ii) Ventricles in vertebrates brain.

   iii) Pronephros kidney.

  B) Write the answer :   **4**

   1) Alimentary canal of frog.

4. Answer **any two** of the following   **10**

   i) Describe respiratory organs in reptiles.

   ii) Describe the mammalian glands.

   iii) Fore guts in birds.

5. Answer **any one** of the following   **10**

   i) Explain the evolution of aortic arches in vertebrates.

   ii) Describe the hard derivatives of vertebrates.

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Seat No.

B.Sc. – III (Semester – V) (Old) Examination, 2016
MATHEMATICS (Special Paper – XI)
Complex Analysis

Day and Date : Saturday, 2-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Select correct alternative for **each** of the following :   **10**

   i) The term holomorphic function is used to denote _____ in a domain.
      a) Integrability   b) Continuity   c) Analyticity   d) None of these

   ii) The curve defined by $z(t) = t^2$, $-1 \leq t \leq 1$ is a _____ curve.
      a) Closed and simple   b) Closed but not simple
      c) Not closed but simple   d) Not closed and not simple

   iii) The residue at $z = a$ is the coefficient of _____ in the Laurent's expansion of $f(z)$.

   a) $\dfrac{1}{z-a}$ b) $\dfrac{1}{(z-a)^{-1}}$ c) $\dfrac{1}{(z-a)^2}$ d) $\dfrac{1}{(z-a)^{-2}}$

   iv) A curve Γ is called closed curve if there exists some parametric representation $z(t) = x(t) + iy(t)$ where $\alpha \leq t \leq \beta$ and $\alpha < \beta$ such that _____

   a) $z(\alpha) + z(\beta) = 0$ b) $z(\alpha) - z(\beta) = 0$

   c) $z(\alpha) \cdot z(\beta) = 0$ d) None of these

   v) With usual notation the Laurent's expansion of $f(z)$ is

   $f(z) = \sum\limits_{n=0}^{\infty} a_n (z-a)^n + \sum\limits_{n=1}^{m} b_n (z-a)^{-n}$ then _____ is called residue of $f(z)$ at $z = a$.

   a) a_0 b) a_1 c) b_1 d) None of these

P.T.O.

vi) A contour is a continuous chain of _____ number of regular arcs.

     a) Zero   b) Finite   c) Infinite   d) None of these

vii) Arc L is non-rectifiable then L has _____

     a) Finite length   b) Infinite length only

     c) No length only   d) No length or infinite length

viii) The derivative of w = f (z) in the polar form is _____

     a) $e^{-i\theta} \dfrac{\partial w}{\partial r}$ b) $e^{i\theta} \dfrac{\partial w}{\partial r}$ c) $e^{i\theta} \dfrac{\partial w}{\partial \theta}$ d) $e^{-i\theta} \dfrac{\partial w}{\partial \theta}$

xi) If $f'(z) = u_x + jv_x$ then $|f'(z)|^2 =$ _____

     a) $\dfrac{\partial (u, v)}{\partial (x, y)}$ b) $\dfrac{\partial (x, y)}{\partial (u, v)}$

     c) $\dfrac{\partial (u, v)}{\partial (x, y)} \cdot \dfrac{\partial (x, y)}{\partial (u, v)}$ d) None of these

x) If $f(z) = |z|^2$ then f (z) is _____

     a) Continuous and differentiable everywhere

     b) Not continuous and differentiable everywhere

     c) Continuous and differentiable at origin only

     d) Not continuous and not differentiable everywhere

2. Attempt **any five** of the the following :   **10**

     a) Show that the harmonic function u satisfies the formal differential equation

$$\frac{\partial^2 u}{\partial z\, \partial \overline{z}} = 0.$$

     b) If f (z) and g (z) are analytic functions in a domain D, then prove that

$$\frac{d}{dz}[f(z)\,g(z)] = f(z)\frac{d}{dz}[g(z)] + g(z)\frac{d}{dz}[f(z)].$$

     c) Define Maclaurin's series for analytic function f (z) within circle.

     d) Find the residue of $f(z) = \dfrac{1}{z - a}$ at infinity.

e) Evaluate $\int\limits_L \dfrac{z+2}{z} dz$ where L is the semi-circle $z = ze^{it}$, $0 \le t \le \pi$.

f) If w = f (z) is analytic in the region R then show that $\dfrac{dw}{dz} = \dfrac{\partial w}{\partial x} = -i\dfrac{\partial w}{\partial y}$.

3. A) Attempt **any two** of the the following :   **6**

   a) Expand $\dfrac{1}{z\left(z^2 - 3z + 2\right)}$ for the regions :

     i) $0 < |z| < 1$

     ii) $1 < |z| < 2$

     iii) $|z| > 2$.

   b) If imaginary part of the analytic function is cosx . coshy then find its real part.

   c) Find the residue of $\dfrac{z^2 - 2z}{(z + 1)^2 \left(z^2 + 4\right)}$ at all its poles.

B) Prove that $\int\limits_0^{2\pi} \dfrac{\sin^2 \theta}{a + b \cos \theta} d\theta = \dfrac{2\pi}{b^2}\left(a - \sqrt{a^2 - b^2}\right)$, $a > b > 0$.   **4**

4. Attempt **any two** of the following :   **10**

   a) State and prove Cauchy's fundamental theorem.

   b) If $u + v = \dfrac{2 \sin 2x}{e^{2y} - e^{-2y} + 2 \cos 2x}$ then find analytic function f (z) = u + iv.

   c) Evaluate $\int\limits_c \left(z^2 + 3z\right) dz$ along the circle $|z| = 2$ from (2, 0) to (0, 2).

5. Attempt **any one** of the the following :   **10**

   a) State and prove Cauchy's residue theorem.

   b) State and prove necessary condition for f (z) to be analytic and verify it for the function f (z) = $(x^3 - 3xy^2) + i (3x^2y - y^3)$.

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Seat
No.

B.Sc. – III (Semester – V) (Old) Examination, 2016
STATISTICS (Special Paper – XI)
Probability Distributions and Stochastic Process

Day and Date : Saturday, 2-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B.: 1) **All** questions are **compulsory**.
2) **Use** of scientific calculators is **allowed**.
3) **Use** of statistical tables is **allowed**.
4) Figures to the **right** indicate **full** marks.

1. Select the most correct alternative.   **10**

    i) Which one of the following is not a one of the possible assumptions of Markov Chain (M.C.)
       a) There are finite or countable number of states
       b) There are finite number of future periods
       c) A future step depends upon present state and not on past states
       d) The states are both collectively exhaustive and mutually exclusive

    ii) If $(X_1, X_2) \sim BN (0, 0, 1, 1, 0)$ then $X_1.X_2^{-1}$ is a _____ r.v.
       a) Cauchy   b) normal   c) lognormal   d) t

    iii) Suppose X is exp (θ) r.v, truncated below 15 then $P(10 < X < 15) =$ _____
       a) 0.5   b) 0.75   c) 0.25   d) 0

    iv) If r.v. X follows Laplace (5, 10) distribution, then $P (X \leq 5) =$ _____
       a) $P(X \geq 5)$ b) 0.5
       c) both a and b   d) neither a nor b nor c

    v) If X_t is the number of passengers on railway station at any time of a day, then for $\{X_t, t \in T\}$, we have state space S and index set T as
       a) both S and T discrete   b) S continuous and T discrete
       c) S discrete and T continuous   d) both S and T continuous

vi) If $P = \begin{bmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{3} & \frac{2}{3} \end{bmatrix}$ is a one step Transition Probability Matrix (TPM) then two step

TPM is _____

a) $\begin{bmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{3} & \frac{2}{3} \end{bmatrix}$

b) $\begin{bmatrix} \frac{7}{18} & \frac{12}{18} \\ \frac{5}{12} & \frac{7}{12} \end{bmatrix}$

c) $\begin{bmatrix} \frac{5}{12} & \frac{7}{12} \\ \frac{7}{18} & \frac{11}{18} \end{bmatrix}$

d) none of these

vii) If X_1 and X_2 are iid standard Cauchy random variables then $\left(\dfrac{X_1 + X_2}{2}\right)$ has

_____ distribution.

a) c (0, 1)   b) c (0, 2)   c) c (1, 1)   d) none of these

viii) If X is lognormal (0, 1) then V (X) =

a) $e^2 - e$ b) $e^2 + e$ c) 1   d) none of these

ix) Let (x, y) ~ B.N. $(0, 0, \sigma_1^2, \sigma_2^2, \rho)$ and suppose $u = \dfrac{x}{y}$ and v = y. Then

marginal distribution of v is

a) Cauchy   b) Normal   c) Lognormal   d) None of these

x) If one step TPM of certain M.C. is $P = \begin{bmatrix} 0.7 & 0.3 \\ 0.1 & 0.9 \end{bmatrix}$, and initial state matrix is

S_0 = [0.8, 0.2] then S_1 =

a) [0.56 0.06]   b) [0.68 0.32]   c) [0.62 0.38]   d) [0.58 0.42]

2. Attempt **any five** from the following :   **10**

a) Define finite Markov Chain.

b) Draw probability curve of Laplace distribution.

c) Suppose X is lognormal (μ, σ^2) r.v. Write expression for mean.

d) State pdf of truncated exponential distribution, truncated to the left of K.

e) State Chapman-Kolmogrov equation.

f) State additive property of two independent Cauchy r.vs.

3. A) Answer **any two** of the following : **6**

    i) Obtain a stationery distribution of a M.C. if one step TPM is $P = \begin{bmatrix} \frac{2}{3} & \frac{1}{3} \\ \frac{1}{2} & \frac{1}{2} \end{bmatrix}$.

    ii) For $(x, y) \sim$ B.N. $(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$ check whether $v(x \mid y = y) \le v(x)$.

    iii) Let $X \sim$ lognormal (μ, σ^2), then $(X + C)$ is said to have shifted lognormal distribution with support $x \in (c, \infty)$. Then find $E(X + C)$ and $V(X + C)$.

3. B) Obtain p.m.f. of truncate Poisson distribution, truncated at $X = 0$. **4**

4. Answer **any two** of the following : **10**

    a) Obtain mgf of Laplace (μ, λ) distribution.

    b) Write the pdf of BN $(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$ distribution and obtain marginal distribution of X.

    c) Obtain the pdf of truncated standard normal distribution, for positive values only.

5. Answer **any two** of the following : **10**

    a) If $X \sim C(0, \lambda)$ then find the distribution of $\frac{1}{X}$.

    b) Assume that a man is at an integral point of X axis between $X = 0$ and $X = 3$.

    If he is at origin, he takes a unit step to right to reach $X = 1$.

    If he is at $X = 3$, he takes a unit step to the left to reach $X = 2$.

    Otherwise he takes a unit step to the right with probability 0.6 and to the left with probability 0.4. Write the state space and one step TPM of this M.C. Also with usual notations find $P[X_2 = 1, X_1 = 2, X_0 = 1]$.

    c) If $(x, y) \sim$ BN $(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$ with pdf $f(x, y) = c$.

$$\exp\left\{\frac{-2}{3}\left[\frac{(x-10)^2}{4} - \frac{(x-10)(y+5)}{6} + \frac{(y+5)^2}{9}\right]\right\} \text{ find } \mu_1, \mu_2, \sigma_1^2, \sigma_2^2 \text{ and } \rho.$$

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Seat No.

B.Sc. – III (Semester – V) (Old) Examination, 2016
PHYSICS (Special Paper – XII)
Electrodynamics

Day and Date : Monday, 4-4-2016　　　　　　　　　　　　Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N. B. : 1) **All** questions are **compulsory**.
　　　　2) Figures to the **right** indicate **full** marks.
　　　　3) **Draw** neat diagrams **whenever** necessary.
　　　　4) **Use** of calculator or log table is **allowed**.

1. Select the correct alternative :　　　　　　　　　　　　　　**10**

　i) Poisson's equation is _____

　　a) $\nabla^2\phi = 0$　　　　　　　　　b) $\nabla^2\phi = \rho\in_0$

　　c) $\nabla^2\phi = \dfrac{\rho}{\in_0}$　　　　　　　d) $\nabla^2\phi = -\rho\in_0$

　ii) The trajectory of a charged particle entering an uniform electric field in a
　　direction perpendicular to $\vec{E}$ is a _____
　　a) Hyperbola　　　　　　　　　b) Parabola
　　c) Ellipse　　　　　　　　　　d) Cycloid

　iii) Self inductance is measured in _____
　　a) Ohm　　　　　　　　　　b) Weber
　　c) Faraday　　　　　　　　　d) Henry

　iv) _____ law explains inertia of electrodynamics.
　　a) Lenz's　　　b) Ohm's　　　c) Ampere's　　d) Kirchhoff's

　v) Mathematical formulation of empirical laws in electricity and magnetism are
　　known as _____ equations.
　　a) Faraday's　　　　　　　　b) Laplace's
　　c) Newton's　　　　　　　　d) Maxwell's

P.T.O.

vi) The statement 'magnetic free poles do not exist is justified by Maxwell's equation _____

a) $\nabla \times \vec{B} = \vec{J} + \dfrac{\partial \vec{D}}{\partial t}$

b) $\nabla \cdot \vec{B} = 0$

c) $\nabla \times \vec{B} = 0$

d) $\nabla \cdot \vec{B} = \rho$

vii) Electric ($\vec{E}$) and magnetic ($\vec{H}$) field vectors are mutually perpendicular to _____ vector.

a) Propagation

b) Poynting's

c) Polarization

d) Magnetization

viii) Momentum density ($\vec{G}$) and Poynting's Vector ($\vec{N}$) are related to each other, in a medium characterized by μ and $\in$ as, _____

a) $\vec{G} = \dfrac{\vec{N}}{\mu \in}$

b) $\vec{G} = \mu \in \vec{N}$

c) $\vec{G} = \sqrt{\mu \in / \vec{N}}$

d) $\vec{G} = \dfrac{\mu \in}{\vec{N}}$

ix) To obtain total internal reflection, the wave must be incident _____

a) Normally

b) In any way

c) From denser medium

d) From rarer medium

x) Static charge can _____

a) Radiate

b) Not radiate

c) Nothing can be said

d) Radiate at some condition

2. Answer **any five** : **10**

i) What is the nature of trajectory of a charged particle moving in crossed uniform electric and magnetic field ?

ii) State Faraday's law of electromagnetic induction.

iii) State Ampere's circuital law.

iv) State Poynting theorem.

v) What is skin depth ?

vi) State the relation between transmission coefficient and reflection coefficient.

3. A) Answer **any two** of the following : **6**

   i) Obtain an expression for self inductance of a straight conductor due to field inside it.

   ii) State and explain Biot-Savarts law.

   iii) Explain in short retarded time and retarded potential.

  B) Prove that for glass-air interface ($n_2 = 1.5$ and $n_1 = 1.0$) for normal incidence of em wave, the reflection coefficient is R = 0.04 and transmission coefficient is T = 0.96 respectively. **4**

4. Answer **any two** of the following : **10**

  i) Define emf and obtain general expression for motional emf.

  ii) Discuss the orthogonality of $\overline{E}$, $\overline{H}$ and $\overline{K}$ vectors of EM wave.

  iii) Write note on total internal reflection.

5. Answer **any one** of the following : **10**

  i) Show that a charged particle moves along a circular path with a constant speed, in a uniform magnetic field ($\overline{B}$).

  ii) State Maxwell's equations for vacuum and explain the physical significance of each term.

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Seat
No.

B.Sc. – III (Semester – V) (Old) Examination, 2016
CHEMISTRY (Special Paper – XII)
Analytical and Industrial Physical Chemistry

Day and Date : Monday, 4-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) **Draw** neat diagrams and give equations **wherever** necessary.
3) Figures to the **right** indicate **full** marks.

1. Select the most correct alternative from among those given below and rewrite
   the sentence :   **10**

   1) Reciprocal of transmittance is called
      a) Optical density   b) Opacity
      c) Transmittance   d) Absorptivity

   2) A device for measuring a response of photocell is called
      a) Voltmeter   b) Galvanometer
      c) Conductometer   d) All of these

   3) SI unit of cell constant is
      a) m^{-1} b) m c) m^2 d) m^{-2}

   4) Resistance of the solution is measured with the help of
      a) Wheatstone bridge   b) Potentiometric bridge
      c) Both a) and b)   d) None of these

   5) For standardisation of potentiometer, a standard cell having voltage
      _____ is generally used.
      a) 1.180 V   b) 1.108 V   c) 1.018 V   d) 2.018 V

   6) In Chromium plating _____ is used as an anode.
      a) Cr   b) Pt   c) Pb   d) Ni

   7) The amount of substance deposited at any electrode is directly proportional
      to the quantity of electricity passed through the electrolyte is known as
      _____ law.
      a) Einstein's   b) Faradays   c) Boltzmann   d) Lamberts

   8) In premix burner _____ percent of sample is used.
      a) 100   b) 50   c) 90   d) 5

P.T.O.

9) Flame photometry is concerned with the measurement of _____ of light emitted when metal is introduced in the flame.
   a) Wavelength
   b) Frequency
   c) Intensity
   d) Velocity

10) Pickling means cleaning of the article by the action of
    a) Acid
    b) Base
    c) Water
    d) None of these

2. Answer **any five** of the following :   **10**

   i) Name the equipments used in Flame photometry.

   ii) Sketch the curve for the conductometric titration of a solution of HCl against a solution of NaOH.

   iii) State Lambert's law.

   iv) Give any two advantages of potentiometric titrations.

   v) Explain the term electroforming.

   vi) Define cell constant. Give its unit.

3. A) Answer **any two** of the following :   **6**
      i) What is conductivity water ? How it is prepared ?
      ii) Give the applications of nickel plating.
      iii) Write a note on photovoltaic cell.

   B) Give a brief account of mirrors and slits.   **4**

4. Answer **any two** of the following :   **10**

   i) Discuss the following parts of colorimeter.
      a) A light filter (monochromator)
      b) A cuvettes.

   ii) Give construction and working of glass electrode.

   iii) What is the function of burners in flame photometry ? Describe in full premix burner.

5. Answer **any two** of the following :   **10**

   i) What is meant by potentiometric titrations ? Explain the location of end point by classical and analytical methods in potentiometric titrations.

   ii) Discuss the basic principles of electroplating.

   iii) Write a note on different types of conductivity cells used in conductance measurements.

Seat
No.

B.Sc. III (Semester – V) Examination, 2016
MATHEMATICS (Special Paper– XII) (Old)
C Programming

Day and Date : Monday, 4-4-2016   Max. Marks : 50
Time : 2.30 p.m. to 4.30 p.m.

N.B. : 1) **All** questions are **compulsory**.

2) Figures to be **right** indicate **full** marks.

1. Choose the correct alternative for **each** of the following :   **10**

   1) The strength of 'C' lies in its _____
      a) Data types   b) Built-in functions
      c) Keywords   d) Powerful operators

   2) The trigraph sequence for ~(tilde) is _____
      a) ?? =   b) ??!   c) ??/   d) ??–

   3) First character of an identifiers must be an alphabet or _____
      a) any digit   b) $ c) #   d) underscore

   4) The number 21,000 is an _____
      a) integer constant   b) invalid constant
      c) real constant   d) string constant

   5) The meaning of ! in C-programming is _____
      a) logical OR   b) logical AND
      c) logical NOT   d) None of these

   6) The simplified form of the statement !(x < y) is _____
      a) x > = y   b) x < = y   c) x = = y   d) x! = y

7) The function that reads the single character from keyboard is _____
   a) getchar ( )   b) getc ( )   c) putc ( )   d) putchar ( )

8) The field specification for reading an integer number is _____
   a) %d   b) %wd   c) %ws   d) %f

9) In an exit-controlled loop, if the body is executed 'n' times, the test condition is evaluated _____ times.

   a) n – 1   b) n   c) n!   d) $n!/2$

10) The _____ statement when executed in a switch statement causes immediate exit from the structure.
   a) default   b) goto   c) break   d) stop

2. Attempt **any five** of the following : **10**

   i) Why and when do we use the # define directive ?

   ii) Write the basic types of C-constants.

   iii) Define the term real Arithmetic.

   iv) What is the purpose of printf ( ) function ?

   v) Write a note on if statement.

   vi) Give one simple example of a do ..... while loop.

3. A) Attempt **any two** of the following : **6**

   i) Write a note on keywords in C-program.

   ii) Discuss the term comma operator.

   iii) What is the general form of The Else If Ladder ?

   B) Describe all additional features of for loop. **4**

4. Attempt **any two** of the following : **10**

   a) Write a C-program to calculate the average of a set of N numbers.

   b) Explain in detail C-Assignment operators.

   c) Describe the structure of a C-program.

5. Attempt **any one** of the following : **10**

a) Discuss the term formatted input in detail.

b) An electricity board charges the following rates for the use of electricity.

Consumption units	Rate of charge
0 – 200	Rs. 0.50 per unit
201 – 400	Rs. 100 + Rs. 0.65 per unit excess of 200
401 – 600	Rs. 230 + Rs. 0.80 per unit excess of 400
601 and above	Rs. 390 + Rs. 1.00 per unit excess of 600

Write a C-program to read the names of users and number of units consumed and print out the charges with names.

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SLR-W – 232

B.Sc. (Part – III) (Semester – V) Examination, 2016
STATISTICS (Special Paper – XII)
Operations Research and Applied Statistics (Old)

Day and Date : Monday, 4-4-2016   Max. Marks : 50

Time : 2.30 p.m. to 4.30 p.m.

Instructions : i) **All** questions are **compulsory**.

ii) Use of simple or scientific calculator is **allowed**.

iii) Figures to the **right** indicate **full** marks.

1. Select most correct alternative :   **10**

   i) Which of the following is not correct ?

   a) A feasible solution of an LPP is independent of the objective function

   b) A feasible region of an LPP must be convex set

   c) The feasible region is also termed as solution space

   d) It is not possible to obtain feasible solution of an LPP by graphical method

   ii) A necessary and sufficient condition for a basic feasible solution to a maximization LPP to be an optimum is that (for all j) :

   a) $z_j - c_j \neq 0$ b) $z_j - c_j \leq 0$

   c) $z_j - c_j = 0$ d) $z_j - c_j \geq 0$

   iii) In final (optimum) simplex table, if $z_j - c_j = 0$ for at least one non-basic variable, then there will be

   a) infeasible solution   b) unbounded solution

   c) alternate solution   d) no solution

P.T.O.

iv) The initial solution of a transportation problem obtained by

   a) North-West corner rule would invariably be optimum

   b) VAM would invariably be very near to optimum solution

   c) Least cost method does not provide the least cost solution to a T.P.

   d) MODI method is infeasible

v) In assignment problem the minimum number of lines covering all zeros in a reduced cost matrix of order n can be

   a) at the least n   b) at the most n

   c) n – 1   d) n + 1

vi) The slack for an activity in network is equal to

   a) LS-ES   b) LF-LS   c) EF-ES   d) EF-LS

vii) In a Single Sampling Plan of sample size n and acceptance number c, if the number of observed defectives d is equal to c, then

   a) the lot is accepted

   b) the lot is rejected

   c) we cannot take the decision of accepting or rejecting the lot

   d) none of these

viii) The consumer will often design the sampling procedure so that the OC curve gives _____ probability of acceptance at the AQL.

   a) a very low   b) a low   c) a high   d) zero

ix) If there are n workers and n jobs in the assignment problem, there would be

   a) n solutions   b) n! solutions

   c) (n – 1) ! solutions   d) $(n!)^n$ solutions

x) In critical path analysis, CPM is

   a) event oriented   b) probabilistic in nature

   c) dynamic in nature   d) deterministic in nature

2. Answer **any five** of the following. **10**

   i) Give a canonical form of a LPP in matrix form.

   ii) Define an artificial variable.

   iii) When is a solution of a transportation problem said to be a degenerate one ?

   iv) Define Producer's risk.

   v) What is a balanced Assignment Problem ?

   vi) Define optimistic time in a PERT.

3. A) Answer **any two** of the following. **6**

   i) Define Project duration, earliest event time and latest event time.

   ii) Give the mathematical form of an Assignment Problem.

   iii) Give the formulae of determining A.T.I. and A.O.Q. in a Single Sampling Plan.

   B) For a Single Sampling Plan with lot size N, n = 20, c = 1 and p = 0.02 find the probability of rejection of the lot. **4**

4. Answer **any two** of the following. **10**

   i) Find IBFS to the following transportation problem by using North-West corner method.

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	

ii) A project schedule has the following activities and the time (in months) of completion of each activity is as follows :

Activity	1 – 2	2 – 3	2 – 4	3 – 5	4 – 5
Time	18	14	15	16	12

iii) Write a procedure of Single Sampling Plan.

5. Answer **any two** of the following. **10**

i) Write a procedure of Graphical method of solving a LPP.

ii) In a Single Sampling Plan if N = 10000, n = 90, c = 2, p = 0.01 and P_a = 0.9497, then calculate the average total inspection per lot and average outgoing quality.

iii) The following assignment problem shows the costs of assigning four tasks to four men. Determine the optimum assignment schedule.

Men

		I	II	III	IV
Tasks	A	18	26	17	11
	B	13	28	14	26
	C	38	19	18	15
	D	19	26	24	10

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SLR-W – 237

B.Sc. – III (Semester – VI) Examination, 2016
ENGLISH Compulsory (Old)
Count-down : English Skills for Success

Day and Date : Tuesday, 22-3-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) ***All*** questions are ***compulsory***.
                        2) Figures to the ***right*** indicate ***full*** marks.

1. A) Choose the correct alternative :   **6**

   i) The higher our self-esteem, the more _____ we tend to be.
      a) Selfish   b) Ambitious
      c) Selfless   d) Helpful

   ii) To be self-assertive is to _____ our wants and needs.
      a) Honour   b) Evaluate
      c) To despise   d) To love

   iii) Our approach to the problem of disease is even less
      a) Irrational   b) Rational
      c) Emotional   d) Intellectual

   iv) Rahim Khan was _____ years old.
      a) Sixty   b) Forty
      c) Forty-five   d) Fifty

   v) In the poem 'Refugee Mother and Child' the smile of the mother is compared
      with
      a) A ghost smile   b) A beautiful smile
      c) An angel smile   d) A monkey smile

   vi) The poet sees the Daffodils dancing in
      a) The forest   b) The breeze
      c) The lake   d) The hills

P.T.O.

B) Rewrite the following sentences choosing the correct idioms.   **2**

   i) She tried very hard to give her children a decent education.

     a) Keep one's fingers crossed   b) Face the music

     c) Move heaven and earth   d) Draw the line

   ii) Smita stayed calm when she found her boat sinking.

     a) Lost her head   b) Kept her head above water

     c) Kept her head   d) Keep one's fingers crossed

C) Rewrite the following sentences choosing the correct collocations.   **2**

   i) Last year, I _____ an M.A. Examination.

     a) Give   b) Faced

     c) Took   d) Had given

   ii) The meeting was organised to _____ the issue of corruption in higher education.

     a) Decide   b) Solve

     c) Finalise   d) Resolve

2. Answer **any five** of the following questions in brief.   **10**

   1) Write any two results of low esteem.

   2) How does science affect the average men and women ?

   3) Why was Rahim Khan disappointed during his youth ?

   4) Write any three pillars of self-esteem.

   5) How were diseases considered during the pre-Christian period ?

   6) How did sparrows provide Rahim Khan with relief ?

3. A) Answer **any two** of the following questions.   **6**

   1) Why is the air described as 'heavy with odours' ?

   2) What is the theme of the poem 'Refugee Mother and Child" ?

   3) What does the poet say about the dance of the Daffodils ?

B) Answer the following :   **4**

   1) You have failed the M.P.S.C. examination. How will you manage the strace of this failure ?

   2) You are working in a multi-national company. You have been transferred to a foreign country. How will you adopt to the foreign environment ?

4. A) Write a description of a woman you met at cinema theatre. Give details of the personality traits of the woman. **10**

OR

B) Describe in details the place you visited in the summer vacation.

5. Read the following passage and summarise it. **10**

Raman was a brilliant student, a very original thinker and a hardworking, disciplined person, but he deserves to be admired for far more than just these qualities. In his youth, India was not a free country and there were hardly any institutions, or even libraries, to support the pursuit of higher education. Raman was able to contribute so greatly to Indian science only because of his deep and genuine passion for physics and his commitment to finding answers to questions that puzzled him. The scientist also showed remarkable independence in choosing to work in areas that excited his curiosity. Further, when faced with a lack of infrastructure, he always improved and built up whatever he needed from scratch. C.V. Raman's determination, spirit and contributions will indeed remain special within the context of the practice of science in India.

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Seat No.

B.Sc. – III (Semester – VI) (Old) Examination, 2016
PHYSICS (Special Paper – XIII)
Nuclear Physics

Day and Date : Wednesday, 23-3-2016

Time : 10.30 a.m. to 12.30 p.m.　　　　　　　　　　　　　Max. Marks : 50

Instructions :　i)　**All** questions are **compulsory**.

　　　　　　　　　ii)　Figures to the **right** indicate **full** marks.

　　　　　　　　　iii)　**Use** of log table or calculator is **allowed**.

　　　　　　　　　iv)　**Neat** diagrams must be drawn **whenever** necessary.

1. Select the correct alternative from the following :　　　　　　　**10**

　　i)　The antiparticle of electron is
　　　　a)　Photon　　　　　b)　Antiproton　　　　c)　Positron　　　　d)　None of these

　　ii)　In a fission reaction, the energy released per fission is _____ MeV.
　　　　a)　100　　　　　　b)　200　　　　　　c)　300　　　　　　d)　400

　　iii)　1 bar n =
　　　　a)　10^{-28} cm^2　　b)　10^{28} m^2　　c)　10^{-28} m^2　　d)　10^{28} cm^2

　　iv)　The bombarding particle in nuclear reaction is
　　　　a)　Projectile　　　b)　Target　　　　　c)　Product　　　　d)　Light particle

　　v)　The accelerator in which two Dee's are used is
　　　　a)　Synchrotron　　b)　Synchro-cyclotron　c)　Cyclotron　　　d)　Betatron

　　vi)　The principle of phase stability is incorporated in
　　　　a)　Synchro-cyclotron　　　　　　　　　b)　Cyclotron
　　　　c)　Betatron　　　　　　　　　　　　　d)　G.M. Counter

　　vii)　The time at which G.M. tube is unable to count pulse is called _____ time.
　　　　a)　Life　　　　　　b)　Recovery　　　　c)　Resolving　　　d)　Dead

　　viii)　1 a.m.u. =
　　　　a)　1.66×10^{-27} kg　b)　1.66×10^{-27} gm　c)　1.66×10^{27} kg　d)　1.66×10^{27} gm

  ix) Positive packing fraction indicates

     a) Greater stability b) Less stability   c) Unstability   d) Total stability

  x) For prolate spheroid

     a) $Q = 0$ b) $Q > 0$ c) $Q < 0$ d) All a), b) & c)

2. Answer **any five** of the following :   **10**

  i) What is dead time and recovery time of G.M. Counter ?

  ii) What are the advantages of bubble chamber ?

  iii) Define packing fraction. Draw packing fraction curve.

  iv) Give one example of $(P.\alpha)$ and $(D.\alpha)$ reaction.

  v) What is stripping reaction ?

  vi) What is quarks ? What are its types ?

3. A) Answer **any two** of the following :   **6**

    i) Explain the principle of phase stability.

    ii) What is Leptons ? What are its properties ?

    iii) Explain Neutron induced reactions.

  B) Explain classification of elementary particles.   **4**

4. Answer **any two** of the following :   **10**

  i) Derive Betatron condition.

  ii) Explain principle, construction and working of scintillation counter.

  iii) Calculate the energy released in the following reaction.

    $Ra^{226} \rightarrow Pb^{206} + 5He^4$
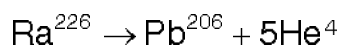
    Given,   Mass of radium = 226.0995 a.m.u.

             Mass of lead = 206.0386 a.m.u.

             Mass of α particle = 4.0030 a.m.u.

5. Answer **any one** of the following :   **10**

  i) What is nuclear reactor ? What are the basic elements of nuclear reactor ? Draw a labelled diagram of nuclear reactor.

  ii) Derive semi-empirical binding energy formula.

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Seat No.

B.Sc. (Part – III) (Semester – VI) (Old) Examination, 2016
CHEMISTRY (Special Paper – XIII)
Physical Chemistry

Day and Date : Wednesday, 23-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) **Neat** diagrams must be drawn **wherever** necessary.
4) **Use** of logarithmic table/scientific calculator is **allowed**.

1. Choose the most correct alternative and rewrite the sentence :   **10**

   1) For spontaneous process change in free energy is
      a) negative   b) zero   c) positive   d) none of these

   2) The dimensions of fugacity is
      a) sec.$^{-1}$ b) pressure   c) temperature   d) cm^3

   3) Work function (A) is defined as
      a) $A = E + TS$ b) $A = G + TS$ c) $A = H + TS$ d) $A = E - TS$

   4) For third reactions, time for completion of half of the reaction is given by
      relation, $t_{\frac{1}{2}} =$

      a) $\dfrac{3}{2Ka^2}$ b) $\dfrac{3}{5Ka^3}$ c) $\dfrac{3Ka^3}{2}$ d) $\dfrac{3K}{2a^3}$

   5) The velocity constant of third order reaction is expressed in _____ units.
      a) $mole^{-2}.(dm^{-3})^{-2}$ b) $mole^{-2}.(dm^3)^2.sec.^{-1}$
      c) $mole^{-2}.sec.^{-1}$ d) $mole^{-3}.sec.^{-2}$

   6) The rate constant 'K' and temperature related by _____ equation.
      a) Clausius   b) Clapeyron   c) Arrhenius   d) Vant Hoff's

   7) The energy of a molecule in second vibrational energy level (v = 2) is _____
      cm^{-1}.

      a) $\dfrac{5}{2}\bar{\omega}_0$ b) $\dfrac{7}{2}\bar{\omega}_0$ c) $\dfrac{9}{2}\bar{\omega}_0$ d) $\dfrac{11}{2}\bar{\omega}_0$

P.T.O.

8) For rotational transitions, selection rule is
   a) $\Delta J = +1$
   b) $\Delta J = \pm 1$
   c) $\Delta J = -1$
   d) $\Delta J = \pm 2$

9) The solution of lower vapour pressure will boils at
   a) lower pressure
   b) higher temperature
   c) higher pressure
   d) lower temperature

10) A liquid mixture which distilled with change in composition is called _____ mixture.
   a) zeotropic
   b) boiling
   c) fractional
   d) azeotropic

2. Answer **any five** of the following :　　　　　　　　　　　　　　　**10**
   1) Explain the term rotational constant.
   2) Define ideal and non-ideal solutions.
   3) Define fugacity and activity.
   4) Show that, $\Delta G = \Delta A + P \Delta V$.
   5) Define side and consecutive reaction.
   6) Explain the term "temperature coefficient" of the reaction.

3. A) Answer **any two** of the following :　　　　　　　　　　　　　　**6**
   1) State and explain Raoult's law.
   2) Give the applications of rotational spectra.
   3) Derive Gibb's-Helmholtz equation in its standard form.

   B) Calculate reduced mass and moment of inertia of $Br^{79} – Cl^{35}$ molecule. The bond length of $Br – Cl$ is 0.214 nm. ($N = 6.024 \times 10^{23}$)　　　　**4**

4. Answer **any two** of the following :　　　　　　　　　　　　　　　**10**
   1) Derive an expression for velocity constant of third order reactions with all reactants at the same initial concentration.
   2) How does Gibb's free energy vary with temperature and pressure ?
   3) Discuss, the vibrational spectra of diatomic molecule.

5. Answer **any two** of the following :　　　　　　　　　　　　　　　**10**
   1) What are azeotropic mixtures ? Discuss the distillation of solutions with system having maximum boiling point.
   2) The vapour pressure of liquid is 7.4×10^4 Pascal at 283 K and 1.06×10^5 Pascal at 293 K. Calculate molar heat of vaporisation of liquid. ($R = 8.314$ JK^{-1} mole^{-1}).
   3) If the rate of reaction gets doubled from 300 K and 310 K. Calculate energy of activation. ($R = 8.314$ JK^{-1}mole^{-1})

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Seat No.

B.Sc. (Part – III) (Semester – VI) (Old) Examination, 2016
ZOOLOGY (Special Paper – XIII)
Physiology

Day and Date : Wednesday, 23-3-2016　　　　　　　　Total Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) *Figures to **right** indicate **full** marks.*
2) ***Draw** neat, labelled diagrams **wherever** necessary.*
3) ***All** questions are **compulsory** and **equal** marks.*

1. Multiple choice questions.　　　　　　　　　　　　　　　**10**

　　i) In mouth the salivary amylase enzyme digest starch is

　　　　a) Fatty acids and glycerol　　　　b) Amino acid

　　　　c) Deretrin and maltose　　　　　d) Lactose and galactose

　　ii) The synthesis of glycogen from proteins and fats is called

　　　　a) Glycolysis　　　　　　　　　　b) Glyconeolysis

　　　　c) Glycogenesis　　　　　　　　　d) Glyconeogenesis

　iii) _____ is called antisterility vitamin.

　　　　a) K　　　　　　b) D　　　　　　c) E　　　　　　d) A

　iv) In an ideal man the systolic blood pressure is _____ mmHg.

　　　　a) 80　　　　　　b) 100　　　　　c) 120　　　　　d) 140

　　v) _____ is used when kidney functions failed.

　　　　a) Spacemaker　　　　　　　　　b) Dialyser

　　　　c) Spegmomanometer　　　　　　d) Stethoscope

　vi) Mammalian urine is _____ to the blood.

　　　　a) Hypotonic　　　b) Isotonic　　　c) Hypertonic　　　d) Dilute

　vii) Beri-beri disorder caused by the deficiency of vit.

　　　　a) B_1　　　　　　b) D　　　　　　c) K　　　　　　d) C

P.T.O.

viii) Sliding filament theory of muscle contraction firstly proposed by

    a) H.E. Hyxley   b) Nicolson   c) Watson   d) Robertson

ix) Bowman's capsules are located in _____ region of kidney.

    a) Medulla   b) Cortex   c) Pelvis   d) Calyx

x) Complete cardiac cycle required _____ sec.

    a) 0.8   b) 0.4   c) 0.1   d) 0.2

2. Answer **any five** of the followings.   **10**

  i) Definition of respiration.

  ii) Draw neat labelled diagram of ECG.

  iii) Physiological role of Vit. D.

  iv) Synaptic vesicles.

  v) Functions of bile.

  vi) Cardiac cycle.

3. A) Answer **any two** of the followings.   **6**
    i) Glycogenolysis
    ii) Dylasis
    iii) Vit.-K.

  B) Write the answer.   **4**
    Ultrastructure of Neuron.

4. Answer **any two** of the followings.   **10**

  i) Ultrastructure of Nephron

  ii) Vit. C – source, role and deficiency

  iii) Ornithin cycle.

5. Answer **any one** of the following.   **10**

  i) Describe process of gastric digestion.

  ii) Describe molecular mechanism of muscle contraction.

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Seat
No.

B.Sc. (Part – III) Semester – VI (Old) Examination, 2016
Special Paper – XIII : MATHEMATICS
Metric Spaces

Day and Date : Wednesday, 23-3-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions :   i) **All** questions are **compulsory**.

     ii) Figures to the **right** indicate **full** marks.

1. Choose correct alternative :   **10**

   1) Let f : R $\rightarrow$ R and a $\in$ R. If f is not continuous at x = a then

     a) W [f : a] > 0   b) W [f : a] < 0

     c) W [f : a] = 0   d) None of these

   2) The class l^2 is the class of all sequences $S = \{S_n\}_{n=1}^{\infty}$ such that

     a) $\sum S_n^2 > \infty$ b) $\sum S_n^2 < \infty$

     c) both (a) and (b)   d) None of these

   3) If A and B are closed subset of R, then A × B is a closed subset of

     a) A   b) B

     c) R   d) R^2

   4) Let X = [0, 1] with absolute value metric $S\left(\frac{1}{2} : \frac{1}{4}\right)$ is $\left(\frac{1}{4}, \frac{3}{4}\right)$ but $S\left(\frac{1}{4} : \frac{1}{2}\right)$ is

     a) $\left(0, \frac{3}{4}\right)$ b) $\left(\frac{1}{4}, \frac{3}{4}\right)$

     c) $\left(\frac{3}{4}, \frac{1}{4}\right)$ d) $\left(\frac{1}{2} : \frac{1}{4}\right)$

5) The subset $\left\{1, \dfrac{1}{2}, \dfrac{1}{3}, \cdots\right\}$ of the real has _____ as a limit point.

   a) 0

   b) $\dfrac{1}{2}$

   c) $\dfrac{1}{3}$

   d) $\dfrac{1}{4}$

6) The metric space (0, 1) with absolute value metric is totally bounded but

   a) not compact

   b) not complete

   c) both (a) and (b)

   d) none of these

7) The closed interval [0, 1] contains its limit

   a) 0

   b) 1

   c) $\dfrac{1}{2}$

   d) both (a) and (b)

8) The complement of closed set is

   a) closed

   b) open

   c) both (a) and (b)

   d) none

9) Let (x_1, d_1), (x_2, d_2) and (x_3, d_3) be metric spaces and let $f : x_1 \to x_2$, $g : x_2 \to x_3$. If f is continuous at $a \in x_1$ and g is continuous at

   a) $a \in x_2$

   b) $f(a) \in x_2$

   c) $a \in x_3$

   d) $f(a) \in x_3$

10) If $f(x) = x^2$, $(-1 \le x \le 1)$ then f attains maximum value at

   a) $x = 0$

   b) $x = \dfrac{1}{2}$

   c) $x = -\dfrac{1}{2}$

   d) $x = 1$

2. Attempt **any five** of the following : **10**

   1) State the Schwarz Inequality theorem.

   2) If $T : x \to x$ is defined as $t_x = x^2$ where $x \in \left(0, \dfrac{1}{3}\right)$

      then T is contraction on $\left[0, \dfrac{1}{3}\right]$.

   3) Prove that $\lim\limits_{x \to 3} (x^2 + 2x) = 15$.

   4) Define metric space (x, d).

   5) Prove that every subset of R_D is open .

   6) Let $f : l^2 \to l^2$, $x = (x_1, x_2, \ldots) \in l^2$ and $f(x) = (0, x_1, x_2 \ldots)$ prove that f is continuous on l^2.

3. A) Attempt **any two** of the following : **6**

    1) Let f and g be continuous function defined on R to R and let h (x, y) = (f(x), g (x)) for (x, y) $\in$ R^2 prove that h is continuous on R^2.

    2) Let (x, d) be metric space and a is point in x. If f and g real valued function, $\lim\limits_{x \to a} f(x) = L$ and $\lim\limits_{x \to a} g(x) = M$ then prove that $\lim\limits_{x \to a} (f(x) + g(x)) = L + M$.

    3) Let (x_1, d_1), (x_2, d_2) and (x_3, d_3) be metric spaces let f : $x_1 \to x_2$, g : $x_2 \to x_3$. If f is continuous at a $\in x_1$ and g is continuous at f(a) $\in x_2$ then gof is continuous at a.

  B) If F_1 and F_2 are closed subset of metric space M_1 then $F_1 \cup F_2$ is also closed. **4**

4. Attempt **any two** of the following : **10**

    1) If G_1 and G_2 are open subset of metric space M, then $G_1 \cap G_2$ is also open.

    2) Let A be subset of the metric space (M, ρ). If (A, ρ) is compact then A is closed subset of (M, ρ).

    3) If $x = (x_1, x_2)$, $y = (y_1, y_2)$ are any two points in R^2, we define

    d (x, y) = $\left| x_1 - y_1 \right| + \left| x_2 - y_2 \right|$, then prove that d is metric for R^2.

5. Attempt **any one** of the following : **10**

    1) Let (M, ρ) be complete metric space. If T is contraction on M, then there is one and only one point x in M such that T_x = x.

    2) If G is an open subset of metric space M. Then $G' = M - G$ is closed. Conversely. If F is closed subset of M, then $F' = M - F$ is open.

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Seat No.

B.Sc. III (Semester – VI) (Old) Examination, 2016
STATISTICS (Special Paper – XIII)
Statistical Inference – II

Day and Date : Wednesday, 23-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) ***All*** questions are ***compulsory*** and carry ***equal*** marks.
                2) Figures to the ***right*** indicate ***full*** marks.

1. Choose the correct alternatives :   **10**

   i) The most preferred C.I. for θ for a fixed and independent coefficient $(1 - \alpha)$ is
      a) with shortest width
      b) with largest width
      c) with an average width
      d) none of the above

   ii) 95% confidence limits for μ of $N(\mu, \sigma^2)$ when σ is known are

      a) $\overline{X} * 1.96 \dfrac{\sigma}{\sqrt{n}}$
      b) $\dfrac{\overline{X}}{1.96 \dfrac{\sigma}{\sqrt{n}}}$
      c) $\overline{X} \pm 1.96 \dfrac{\sigma}{\sqrt{n}}$
      d) none of these

   iii) For a random sample of size n from $N(\mu, \sigma^2)$ with known μ, the degrees of

      freedom of $\dfrac{ns^2}{\sigma^2}$ is

      a) n
      b) n + 1
      c) n – 1
      d) n^2

   iv) The hypothesis under test is
      a) Null hypothesis   b) Alternative hypothesis
      c) Composite hypothesis   d) None of these

   v) A wrong decision about H_0 leads to
      a) Type I error   b) Type II error
      c) Type III error   d) Type IV error

vi) Neyman-Pearson lemma provides

    a) randomized test   b) non-randomized test

    c) most powerful test   d) none of these

vii) SPRT was initiated by

    a) Fisher   b) A. Wald   c) C.R. Rao   d) None of these

viii) Kolmogorov-Smirnov test is a

    a) Left sided test   b) Right sided test

    c) Two-sided test   d) All of the above

ix) Which of the following test is applicable to paired data ?

    a) The sign test   b) The median test

    c) Wilcoxon signed rank test   d) Both a) and b)

x) Reduction in the size of a test results

    a) decrease in its power   b) increase in its power

    c) no change in its power   d) all of the above

2. Solve **any five** :   **10**

    1) Define a simple and composite hypothesis.

    2) Define interval estimation.

    3) Define a critical region and an acceptance region.

    4) Define likelihood ratio test.

    5) What are the demerits of NP tests ?

    6) Explain in short, the sign test for paired sample.

3. A) Solve **any two** :   **6**

      i) Use Neyman-Pearson lemma to obtain best critical region for testing $\mu = \mu_0$

        against $\mu = \mu_1 < \mu_0$ in case of normal population $N(\mu, \sigma^2)$ when σ^2 is known.

      ii) Explain in short the sign test for one sample.

      iii) Distinguish between parametric and non-parametric tests.

  B) Obtain $100(1 - \alpha)$% confidence interval for μ of normal distribution when σ^2 is known.   **4**

4. Solve **any two** of the following : **10**

   i) Construct a Most Powerful (MP) test of size α for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1$ based on a sample of size n from the distribution having pdf $f(x, \theta) = \theta.e^{-\theta x}$ $x \geq 0$, $\theta > 0$.

   ii) A sample of size one from uniform distribution for $f(x, \theta) = \dfrac{1}{\theta}$ $0 \leq x \leq \theta$ is drawn to test the hypothesis $H_0 : \theta = 1$ against $H_1 : \theta = 2$. The hypothesis H_0 is accepted if the observed value of X is less than or equal to 0.5. Find the probabilities of type I and type II errors and also find the power of the test.

   iii) Explain fully the Kolmogorov-Smirnov one sample test.

5. Solve **any two** of the following : **10**

   i) Let X be a discrete r.v. having a pmf $f(x, \theta) = \theta^x(1 - \theta)^{1-x}$ $x = 0, 1$. Obtain the SPRT of strength (α, β) for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 < \theta_0$.

   ii) Obtain the LRT for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu \neq \mu_0$ based on a random sample from $N(\mu, \sigma^2)$ when σ^2 is unknown.

   iii) Based on a large sample obtain the confidence interval of level $(1 - \alpha)$ for population proportion.

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Seat No.

B.Sc. – III (Semester – VI) Examination, 2016
MICROBIOLOGY
Microbial Genetics (Special Paper XIII) (Old)

Day and Date : Wednesday, 23-3-2016　　　　　　Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.

　　　　　　　　2) Figures to **right** indicate **full** marks.

1. Rewrite the sentences after choosing correct answer from the given alternatives : **10**

　　1) The conversion of a gene's nucleotide sequence into a mRNA is called as _____
　　　　A) The genome　　　　　　　　　B) Gene expression
　　　　C) Transcription　　　　　　　　 D) Translation

　　2) The exact point where nucleotides are being added to growing daughter strands during DNA replication are called _____
　　　　A) The origin　　　　　　　　　　B) The double helix
　　　　C) The template　　　　　　　　 D) The replication fork

　　3) In the Lac-operon the genes in the operon are_____
　　　　A) Always expressed
　　　　B) Only expressed when lactose is present
　　　　C) Never express
　　　　D) Only expressed when lactose is absent

　　4) Which of the following is the best description of a gene ?
　　　　A) A molecule of DNA
　　　　B) A nucleotide
　　　　C) A sequence of DNA nucleotides that codes for a single protein
　　　　D) A molecule of RNA

P.T.O.

5) Helix unwinding during replication is accomplished by_____

   A) DNA helicases   B) DNA gyrase

   C) DNA polymerase I   D) DNA polymerase II

6) If a particular DNA sequence is CGTACA, the corresponding RNA sequence will be_____

   A) AGATTC   B) GCAUGU   C) AGAUUC   D) UCUAAG

7) Different forms of the same gene are called_____

   A) Alleles   B) Gametes

   C) Genotypes   D) Recombined genes

8) Mutations arising from insertion or deletion of nucleotides are called _____

   A) Suppressor mutations   B) Base pair substitutions

   C) Frame shift mutations   D) Spontaneous mutations

9) The initial source for all genetic variation is _____

   A) Sexual reproduction   B) Mutation

   C) Conjugation   D) Transformation

10) Okazaki fragments are synthesized in _____ direction.

   A) Opposite   B) Same

   C) No relation of the replication fork   D) Any

2. Answer **any five** of the following :   **10**

   i) Explain palindromes.

   ii) What is electrophoresis ?

   iii) What are adapters ?

   iv) Define cosmids.

   v) Explain insertion vectors.

   vi) Define replication.

   vii) What is silent mutation ?

3. A) Answer **any two** of the following : **6**

    a) Describe briefly genetic complementation.

    b) Discuss the replication of DNA.

    c) Briefly explain nonsense mutations.

  B) Discuss briefly structural organization of *E.coli* chromosome. **4**

4. Answer **any two** of the following : **10**

    i) Give the detail account of operon concept with example.

    ii) Briefly discuss the Cis trans test.

    iii) Give the detailed account of time course of phenotypic expression in mutation.

5. Write in short on **any two** of the following : **10**

    i) Explain in detail effect of mutation on phenotypes.

    ii) Give the detailed account of transcription.

    iii) Describe briefly protein engineering.

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B.Sc. – III (Semester – VI) (Old) Examination, 2016
PHYSICS
Materials Science (Special Paper – XIV)

Day and Date : Saturday, 26-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : i) **All** questions are **compulsory**.
    ii) Figures to the **right** indicate **full** marks.
    iii) **Neat** diagrams must be drawn **wherever** necessary.
    iv) **Use** of log table and calculator are **allowed**.

1. Select the correct alternatives from the following :   **10**

   i) Time dependent permanent deformation is called _____
     a) Plastic deformation   b) Elastic deformation
     c) Creep   d) Fatigue

   ii) Reciprocal of resistance is _____
     a) Conductance   b) Inductance   c) Reluctance   d) None of the a, b, c

   iii) Strength and hardness increases when metals are
     a) cold worked   b) hot worked   c) annealed   d) sintered

   iv) Ceramics are _____ materials.
     a) inorganic, non metallic   b) organic metallic
     c) metallic   d) non metallic

   v) _____ polymer occurs naturally.
     a) Nylon   b) Starch   c) PVC   d) Teflon

   vi) The addition of same kind of monomer is known as
     a) hetero-polymerization   b) co-polymerization
     c) homo-polymerization   d) condensation polymerization

   vii) Ceramic normally exhibit _____ fracture.
     a) hard   b) brittle   c) soft   d) cold

viii) In nanometer scale size of the grain is
a) 10^{-3} m
b) 10^{-6} m
c) 10^{-9} m
d) 10^{-12} m

ix) Gibb's phase rule is given by the relation
a) $F = C - P + 2$
b) $F = C + n + P$
c) $F = C + 2n - P$
d) $F = C - 2P + n$

x) The phase boundary between solid and the two phase region is called
a) liquid
b) liquidus
c) solid
d) solidus

2. Answer **any five** of the following : **10**

i) Define the terms – fatigue, stiffness.

ii) Write any two applications of polymers.

iii) What is ceramic ? Write any two examples of ceramic materials.

iv) What is meant by recovery and recrystallization ?

v) Give any two applications of phase diagram.

vi) Define degree of polymerization.

3. A) Answer **any two** of the following : **6**

i) Discuss the electrical properties of materials.

ii) Write note on condensation polymerization.

iii) Define the term nanotechnology and write any two applications of nanophase materials.

B) Explain any two magnetic properties of materials. **4**

4. Answer **any two** of the following : **10**

i) Explain with structure :
a) Linear polymers
b) Three dimensional polymers

ii) Write short note on ceramic processing.

iii) Explain in detail any one method of synthesis of nanophase materials.

5. Answer **any one** of the following : **10**

i) Define elastic and plastic deformations. Describe in detail Critical Resolved Shear Stress (CRSS).

ii) Define phase diagram and discuss binary phase diagram of $Al_2O_3 - Cr_2O_3$ in detail.

_____

Seat No.

B.Sc. – III (Semester – VI) (Old) Examination, 2016
CHEMISTRY (SPECIAL Paper – XIV)
Inorganic Chemistry

Day and Date : Saturday, 26-3-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.

2) Draw **neat** diagram and give equations **wherever** necessary.

3) Figures to the **right** indicate **full** marks.

1. Select the most correct alternative for the following and rewrite the sentences :   **10**

   1) The name of element with atomic number 110 is

      a) un-nil un   b) un-un. nil   c) nil-un-un   d) nil-nil-un

   2) Germanium doped with acceptor atom is called _____ conductor.

      a) super   b) n – type   c) p – type   d) mixed oxide

   3) In XeF_6 molecule, Xe shows _____ hybridisation.

      a) Sp^3d^3 b) d^2Sp^3 c) Sp^3 d) dSp^2

   4) The actinons and Lanthanons are collectively known as

      a) Rare elements   b) Inner transition elements

      c) Representative elements   d) d – block elements

   5) Alkyl Berryllium compounds are

      a) Electron deficient   b) Electron rich

      c) Ionic compound   d) Covalent compound

   6) Corrosion increases with _____ in temp.

      a) decrease   b) moderate   c) increase   d) none of these

   7) Mixed oxide super conductors have the formula

      a) $YBa_2Cu_3O_7 – x$ b) $YBa_3Cu_3O7 – x$

      c) $YBa_2Cu_2O_7 – x$ d) $YBa_2Cu_3O_6$

P.T.O.

8) Bonding in metal is best explained by _____ theory.

   a) Valence bond   b) Molecular orbital

   c) Crystal field   d) Ligand field

9) Galvanised iron is obtained by _____ method.

   a) hot dipping   b) cold dipping   c) solvent dipping   d) all of these

10) Actinides have _____ incomplete outer shells.

   a) 3   b) 2   c) 1   d) 4

2. Answer **any five** of the following.   **10**

   1) Explain p – type of semiconductor.

   2) Define F – block elements.

   3) Draw the structure of XeO_4.

   4) Define the term organometallic compound.

   5) Explain atmospheric corrosion.

   6) What are the applications of superconductors ?

3. A) Answer **any two** of the following.   **6**

   1) Explain the bulk separation method of Lanthanides.

   2) Explain intrinsic semiconductors.

   3) Discuss the structure of XeO_4.

   B) Write a note on electrochemical-theory of corrosion.   **4**

4. Write note on **any two** of the following.   **10**

   1) Discuss structural study of Alkyl berryllium compound.

2) What are TU elements ? Explain the heavy ion bombardment method for preparation of TU elements.

3) Give the electronic configuration of Lanthanides.

5. Answer **any two** of the following. **10**

1) Draw and explain the structure of diborane.

2) Define semiconductors. Explain p – type semiconductors.

3) Explain the factors affecting corrosion.

_____

SLR-W – 250

Seat No.

B.Sc. – III (Semester – VI) Examination, 2016
BOTANY (Old)
Systematics of Angiosperms (Special Paper – XIV)

Day and Date : Saturday, 26-3-2016　　　　　　　　　Total Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Draw **neat** labeled diagrams **wherever** necessary.
　　　　　　　　3) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences, choosing the correct alternative :'　　　**10**

　　1) Bennettitalean theory was proposed by _____
　　　　a) Saporta and Marion　　　　　b) Thomas
　　　　c) Stebbins　　　　　　　　　　d) Gaussen

　　2) Engler and Prantl published their work under the name _____
　　　　a) Families of flowering plants
　　　　b) The classification of flowering plants
　　　　c) Die naturalischen pflazen familiean
　　　　d) Genera plantarum

　　3) Dumb-bell shaped stomata occurs in _____ type.
　　　　a) Dicotyledons　　　　　　　b) Monocotyledons
　　　　c) Both a) and b)　　　　　　 d) None of these

　　4) The development of embryo sac in *polygonum* is _____ type.
　　　　a) Monosporic　　　　　　　　b) Bisporic
　　　　c) Tetrasporic　　　　　　　　d) Trisporic

　　5) _____ cells plays a role of nutrition.
　　　　a) Epidermis　　　　　　　　　b) Endothecium
　　　　c) Tapatum　　　　　　　　　　d) Sporogenous tissue

　　6) In Bisporic embryo sac the egg apparatus is made up of _____ cells.
　　　　a) One　　　b) Two　　　c) Three　　　d) Four

　　7) The flowers pollinated by birds are called as _____
　　　　a) Malcophelous　　　　　　　b) Ornithophelous
　　　　c) Entemophelous　　　　　　 d) Hydrophelous

P.T.O.

8) Free nuclear divisions occurs in _____ type of endosperm.

   a) Helobial   b) Cellular   c) Nuclear   d) None of these

9) The dispersal of coconut fruit takes place by

   a) Water   b) Wind   c) Insects   d) Bat

10) The fruit of *Citrus* is _____ type.

   a) Hypanthodium   b) Hespiridium

   c) Berry   d) Drup

2. Answer **any five** of the following :   **10**

  i) What is meant by flower primordia ?

  ii) Give the primitive characters of flower.

  iii) Write the functions of endothecium.

  iv) Sketch and label the orthotropous ovul.

  v) Mention the economic importance of Lamiaceae.

  vi) Define cleistogamy.

3. A) Answer **any two** of the following :   **6**

    i) Describe Bennettitalean theory.

    ii) Describe the helobial endosperm development.

    iii) Role of anatomy in relation with taxonomy.

  B) Give outline of Engler and Prantl's system of classification.   **4**

4. Answer **any two** of the following :   **10**

  i) Describe different agencies of pollination.

  ii) Describe the Bisporic embryo sac with suitable example.

  iii) Write economic importance of Poaceae.

5. Answer **any two** of the following :   **10**

  i) What is meant by megasporogenesis ? Add a note on development of typical female gametophyte.

  ii) Describe the animal dispersal mechanism in fruits.

  iii) Give the distinguishing characters of any one of the following families and mention one plant of economic importance from it.

    a) Rubiaceae

    b) Polygonaceae.

Seat
No.

B.Sc. – III (Semester – VI) Examination, 2016
ZOOLOGY (Special Paper – XIV) (Old)
Endocrinology, Environmental Biology and Toxicology

Day and Date : Saturday, 26-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. :   i) **All** questions are **compulsory**.
         ii) Figures to the **right** indicate **full** marks.
         iii) Draw neat labelled diagrams **wherever** necessary.

1. Select the appropriate answer from each of the following and rewrite the
   sentences.   **10**

   1) _____ hormone increases the metabolic rate.
      a) STH   b) Insulin   c) Thyroxine   d) Testosterone

   2) _____ gland produce calcitonin hormone.
      a) Parathyroid   b) Thyroid   c) Adrenal   d) Thymus

   3) The hormone responsible regulation of calcium and phosphorous metabolism
      is secreted by
      a) Pancreas   b) Adrenal   c) Thymus   d) Parathyroid

   4) Islets of Langerhans produce
      a) Rennin   b) Ptylin   c) Insulin   d) HCl

   5) The most important reason for decrease in biodiversity
      a) habitat pollution   b) introduction of exotic species
      c) over exploitation   d) habitat destruction

   6) All are insitu conservation efforts, except
      a) National parks   b) Sanctuaries
      c) Zoo   d) Biospheres reserves

   7) In Rock Baranacle (Balanus) adoptation for attachment to substratum is
      a) Muscular foot   b) Cement gland
      c) Byssus thread   d) Pedal disc

8) Lotic is the term used for
   a) Standing water
   b) Running water
   c) Pond water
   d) Tank water

9) Long term exposure to a toxic chemical produces an effect called
   a) acute
   b) highly acute
   c) subchronic
   d) chronic

10) _____ is the deposition of chemical substances in a biological organisms.
   a) Bioremediation
   b) Bioaccumulation
   c) Biomagnification
   d) Bioconservation

2. Answer **any five** of the followings (definitions) :   **10**
   i) TRH
   ii) α-cells of ilets (alpha cells)
   iii) Mineralo-corticoids
   iv) Pesticides
   v) Biological indicators
   vi) Prostaglandins.

3. A) Answer **any two** of the following :   **6**
   i) Biomagnification.
   ii) Waste water management (any one type).
   iii) Disorders of thyroid hormones.

   B) Histology of islets of Langerhans.   **4**

4. Answer **any two** of the following :   **10**
   i) Hormones of parathyroid glands.
   ii) Rain water harvesting.
   iii) Faunal adoptation of marine water habitat.

5. Answer **any one** of the followings :   **10**
   i) Describe the characteristics and faunal adoptation of fresh water habitat.

   ii) Describe anatomy and hormonal secretion of adrenal gland.

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Seat No.

B.Sc. – III (Semester – VI) (Old) Examination, 2016
MATHEMATICS
Linear Algebra (Special Paper – XIV)

Day and Date : Saturday, 26-3-2016
Time : 10.30 a.m. to 12.30 p.m.

Max. Marks : 50

N.B. : 1) ***All*** questions are ***compulsory***.
2) *Figures to the **right** indicate **full** marks.*

1. Choose the correct alternative of the following : **10**

   1) Let V be a vector space and let $S_1 \subseteq S_2 \subseteq V$ and

      p) S_1 is linearly dependent

      q) S_2 is linearly dependent

      a) $p \Rightarrow q$ b) $q \Rightarrow p$ c) $p \Leftrightarrow q$ d) None of these

   2) Let V is vector space and S is subset of V then S is orthonormal iff

      a) $\langle v_i, v_j \rangle = 0$ b) $\langle v_i, v_j \rangle = 1$

      c) $\langle v_i, v_j \rangle = \delta_{ij}$ d) None of these

   3) The vector space $M_{n \times n}$ (F) has dimension

      a) n   b) n^2 c) $\dfrac{n(n+1)}{2}$ d) None of these

   4) The span {(0, 1, 0) (0, 0,1)} contains all points in

      a) xy plane   b) yz plane   c) xz plane   d) none of these

   5) Let V and W be finite dimensional vector space and $T : V \rightarrow W$ is linear if dim(V) < dim(W) then
      a) T cannot be onto
      b) T cannot be one-one
      c) T cannot be one-one and onto
      d) None of these

6) In an inner product space V. Norm V. is

   a) $\langle v, v \rangle$

   b) $\langle v, v \rangle^2$

   c) $\sqrt{\langle v, v \rangle}$

   d) None of these

7) The vector V_1, V_2, ... V_n in a vector space V(F) are said to be linearly

   independent if $\sum_{i=1}^{n} \alpha_i V_i = 0, \alpha_i \in F$ implies

   a) All $\alpha_i = 0$

   b) All $\alpha_i \neq 0$

   c) Atleast one $\alpha_i \neq 0$

   d) None of these

8) $T : P_1(R) \rightarrow R^2$ is linear transformation defined by $T(a + bX) = (a, a + b)$ then

   $[T]_\beta^\gamma = $ _____

   a) $\begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$

   b) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

   c) $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$

   d) None of these

9) Every _____ dimensional inner product space has an orthonormal basis.

   a) Finite

   b) Non-zero finite

   c) Infinite

   d) None of these

10) Union of two subspace of a vector space is _____

   a) Null space

   b) Always a subspace

   c) Euclidean space

   d) None of these

2. Attempt **any five** : **10**

   1) If x, y and z are vector space V such that X + Z = Y + Z show that X = Y.

   2) Prove that 0.x =0 in vector space .V(F) for all $x \in V$.

   3) Prove that $\| CX \| = | C | \ \| X \|$ for all $C \in F$, $X \in V$.

   4) Let V be an inner product space and x, y, z $\in$ V then for $\langle x, y \rangle = \langle x, z \rangle$

      $\forall x \in V$ show that y = z.

   5) Let $T : v \rightarrow W$ be linear then define N(T) and R(T).

   6) Determine whether the first vector can be written as linear combination of other two vectors (2, − 1, 1) (1, 0, 2) (−1, 1, 1).

3. A) Solve **any two** : **6**

1) Let V be the vector space T, U_1, $U_2 \in L(U)$ then show that
$(U_1 + U_2) T = U_1 T + U_2 T$.

2) $T : R_2 \to R_2$ is linear transformation $T(1, 0) = (1, 4)$ and $T(1, 1) = (2, 5)$.
What is $T(2, 3)$?

3) Let $x = (3, 2, 5) \in V_3 (R)$ with standard inner product find $\| X \|$ and find unit vector.

B) Let V be the vector space over F prove that for $x, y \in V$

$$\langle x, y \rangle = \frac{1}{4} \| x + y \|^2 - \frac{1}{4} \| x - y \|^2.$$ **4**

4. Attempt **any two** : **10**

1) Show that the set $\{(1, 3, - 4, 2) (2, 2, - 4, 0) (1, - 3, 2, - 4) (- 1, 0, 1, 0)\}$ is linearly dependent.

2) In C([0, 1]) let $f(t) = t$ and $g(t) = e^t$ define $\langle f, g \rangle = \int\limits_0^1 f(t) \, g(t) \, dt$.

compute $\| f \|, \| g \|$.

3) Let $T : R^2 \to R^2$ be given by

$T(X, Y) = (X + Y, X - Y)$

Show that T is linear.

5. Attempt **any one** : **10**

1) Let V and W be vector space and let $T : V \to W$ be linear. If V is finite dimensional. Then show that nullity (T) + rank (T) = dim(V).

2) Using Gram-Schmidt orthogonalization process find the orthonormal basis of R^3 for $\{V_1 = (1, 0, 1, 0), V_2 = (1, 1, 1, 1), V_3 = (0, 1, 2, 1)\}$.

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Seat No.

B.Sc. (Part – III) (Semester – VI) (Old) Examination, 2016
STATISTICS
Design of Experiments (Special) (Paper – XIV)

Day and Date : Saturday, 26-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative from the following :   **10**

   i) An experimental design is

      a) A map   b) A plan of experiment

      c) An architect   d) All the above

   ii) Local control in experimental designs is meant to

      a) Increase the efficiency of the design

      b) Reduce experimental error

      c) To form homogeneous blocks

      d) All the above

   iii) Two contracts of the same treatments are said to be orthogonal iff

      a) They are at right angles

      b) Both of them have same coefficients of the treatments

      c) Both of them have equal coefficients but opposite in sign

      d) The sum of the cross product of the coefficients of the same treatments is zero

   iv) In a CRD with 't' treatments and 'n' experimental units, error degrees of freedom is equal to

      a) $n - t$ b) $n - t - l$

      c) $n - t + l$ d) $t - n$

v) Randomized block design is a

   a) Three restrictional design   b) Two restrictional design

   c) One restrictional design   d) No restrictional design

vi) A Latin Square Design possesses

   a) One way classification   b) Two way classification

   c) Three way classification   d) No way classification

vii) If the same factorial effect is confounded in all the replications, it is known as

   a) Partial confounding   b) Total cofounding

   c) Conservative confounding   d) None of the above

viii) When the treatments require different size plot for experimentation, frequently adopted design is

   a) Confounded design   b) Split plot design

   c) Latin square design   d) None of the above

ix) CRD is suitable in the situation(s) when

   a) All experimental units are homogeneous

   b) The units are likely to be destroyed during experimentation

   c) Some units are likely to fail to response

   d) All the above

x) In a LSD with 5 treatments, error d.f will be

   a) 20   b) 16

   c) 12   d) 25

2. Attempt **any five** from the following :   **10**

  i) Define a treatment.

  ii) Construction of layout in total confounding in 2^3 factorial experiment.

  iii) Explain experimental error.

  iv) Explain split plot design.

  v) Explain efficiency of design.

  vi) Define contrast and orthogonal contrast.

3. A) Attempt **any two** of the following : **6**

    i) Give assumptions and mathematical model of CRD.

    ii) Describe LSD.

    iii) Define a factor, level and treatment combination in case of factorial experiments.

  B) Explain the Yate's procedure of obtaining main effects and interactions in 2^2 factorial experiment. **4**

4. Answer **any two** of the following : **10**

    i) What is RBD ? Give its mathematical model and analysis of variance table.

    ii) Explain the procedure of obtaining the estimate of one missing value in LSD.

    iii) Give the plan of a 2^3 factorial experiment where all the interactions are partially confounded. Give its analysis of variance table.

5. Answer **any two** of the following : **10**

    i) What are the basic principles of an experimental design ? Explain them.

    ii) Find the efficiency of RBD over CRD.

    iii) Explain the concept of confounding in a factorial experiment. Distinguish between total and partial confounding.

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Seat
No.

B.Sc. III (Semester – VI) (Old) Examination, 2016
GEOLOGY (Special Paper – XIV)
Pre-Cambrian Stratigraphy of India

Day and Date : Saturday, 26-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** labelled diagrams **wherever** necessary.

1. Fill in the blanks with correct answer from given options :   **10**

   1) The oldest rocks forming the foundation rocks over which all the other rock systems have been deposited are known as _____ complex.
      a) Basement   b) Fundamental   c) Archean   d) All of these

   2) Saucer series is equivalent to
      a) Peninsular gneiss   b) Upper Dharwar
      c) Middle Dharwar   d) Lower Dharwar

   3) 'Ajabgarh series' belong to
      a) Delhi system   b) Bundelkhand gneiss
      c) Aravali system   d) None of these

   4) Which formation of Saucer group is more important for manganese ore ?
      a) Sitasaong formation   b) Lohangi formation
      c) Mansar formation   d) Chorbaoli formation

   5) Aravali system is overlain by
      a) Bundelkhand gneiss   b) Raialo series
      c) Bangol gneiss   d) Charnokite series

   6) Which one of the following series forms in the upper Cuddapah System ?
      a) Papaghani   b) Cheyair   c) Kistna   d) Kurnool

   7) Bhima series is a part of _____ Vindhyan.
      a) Upper   b) Middle   c) Lower   d) None of these

8) Dharwarian rocks of manganese deposits occurs in Nagpur, Chhindwara and Bhandara district have been named as
   a) Iron-ore   b) Sausar   c) Chilpi   d) None of these

9) 'Alwar series' belong to
   a) Delhi system   b) Bundelkhand gneiss
   c) Aravali system   d) None of these

10) Which one of the following series of Vindhyan System show occurrences of life ?
   a) Bhander   b) Rewah   c) Kaimur   d) None of these

2. Answer **any five** of the following :   **10**
   i) What are the major rock types found in Archean System ?
   ii) Name of rock type exposed in Bundelkhand gneiss of Archean System.
   iii) What are types of rocks found in Dharwar System ?
   iv) What are Champion gneisses ?
   v) Chilpi Ghat series are overlained by which system ?
   vi) Which system in North India is equivalent of Cuddapah System ?

3. A) Answer **any two** of the following :   **6**
      i) Describe Kaladgi series.
      ii) Explain Sakoli series.
      iii) Describe fundamental gneisses.

   B) Describe economic importance of Aravalis of Rajasthan.   **4**

4. Answer **any two** of the following :   **10**
   i) Describe in brief with stratigraphic sequence and lithology of Bhandar and Rewa series.
   ii) Describe Delhi system.
   iii) Describe in brief with stratigraphic sequence and lithology of Lower Cuddapah System.

5. Answer **any two** of the following :   **10**
   i) Describe in brief with stratigraphic sequence and lithology of Upper Vindhyan System.
   ii) Describe in detail economic importance of Cuddaph System.
   iii) Describe in brief with stratigraphic sequence, lithology of Kurnool System.

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Seat
No.

B.Sc. – III (Semester – VI) (Old) Examination, 2016
MICROBIOLOGY (Special Paper – XIV)
Microbial Biochemistry

Day and Date : Saturday, 26-3-2016   Max. Marks : 50
Time :10.30 a.m. to 12.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences by selecting correct alternative :   **10**

    1) _____ is non sense codon.

       a) UAG   b) AUG   c) GAV   d) AGU

    2) The lock and key model for mechanism of enzyme action was proposed
       by _____

       a) Fisher   b) Koshland   c) Sanger   d) Buchner

    3) _____ enzyme is involved in light producing reaction in bioluminescence.

       a) Luciferase   b) Lactate dehydrogenase

       c) β-galactosidase   d) Acetyl transferase

    4) All enzymes are proteins except _____

       a) Ligases   b) Amylase   c) Protease   d) Ribozyme

    5) Precursor for purine biosynthesis is _____

       a) Inosinic acid   b) Pyruvic acid

       c) Lactic acid   d) Citric acid

    6) _____ is precursor for peptidoglycan biosynthesis.

       a) Glucose   b) Fructose   c) Sucrose   d) Maltose

    7) Glyoxylate pathway is modification of _____

       a) PP pathway   b) TCA cycle

       c) EMP pathway   d) ED pathway

    8) In catabolite repression _____ catabolite of glucose play important role.

       a) ATP   b) AMP   c) C-AMP   d) ADP

9) GOGAT play role in assimilation of _____

    a) Carbon   b) Phosphate   c) Sulphur   d) Ammonia

10) Induced fit hypothesis was proposed by _____

    a) Fischer   b) Koshland   c) Lister   d) Monod

2. Answer **any five** of the following :   **10**

   i) Explain role of nitrogenase.

   ii) What is cold light ?

   iii) What is absolute specificity ? Give example.

   iv) Explain role of C_{55} lipid carrier in peptidoglycan synthesis.

   v) List nonsense codons and release factors.

   vi) What is bioluminescence ?

3. A) Answer **any two** of the following :   **6**

   i) Explain sequential model for allosteric enzymes.

   ii) Give an account of purification of enzyme on the basis of affinity.

   iii) Write on extraction of enzymes.

  B) Regulation of enzyme by catabolite repression.   **4**

4. Answer **any two** of the following :   **10**

   i) ED pathway

   ii) Define KM and derive Michalis Menton equation.

   iii) Arabinose operon.

5. Answer **any two** of the following :   **10**

   i) Explain in detail factors affecting enzyme catalysed reactions.

   ii) Phospho-ketolase pathway.

   iii) Write on methods of immobilization.

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Seat No.

B.Sc. – III (Semester – VI) Examination, 2016
COMPUTER SCIENCE (Old)
Advanced Java (Special Paper – XIV)

Day and Date : Saturday, 26-03-2016　　　　　　　　Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

N. B. : 1) **All** questions are **compulsory**.
　　　　 2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative. **10**

　1) Jcomponent is the immediate super class of the Japplet class

　　a) True　　　　　　　b) False

　2) _____ method (s) is/are needed for loading a Database driver in JDBC.

　　a) registerDriver　　　　　　b) Class.forName()

　　c) Both (a) and (b)　　　　　　d) getConnection

　3) In a URL query String, the _____ symbol denotes a space character.

　　a) ?　　　　　b) =　　　　　c) +　　　　　d) &

　4) _____ method of Graphic class is used to draw a string on an applet.

　　a) writeString　　b) drawString　　c) println()　　d) All of these

　5) Which of the following component allow multiple selections ?

　　a) Radio Button　　b) CheckBox　　c) TextBox　　d) MultipleBox

　6) Multiple session can access statefull session beans at the same time.

　　a) True　　　　　　　b) False

　7) A service () method is invoked only when _____ method is invoked.

　　a) destroy ()　　b) init ()　　c) start ()　　d) all of these

　8) _____ is a default layout manager in the frame.

　　a) BorderLayout　　b) FlowLayout　　c) GridLayout　　d) GrideBagLayout

P.T.O.

9) _____ component creates space for single line text.

   a) Text Area   b) Text Field   c) Text Space   d) All of these

10) _____ are the small programs written in Java which are loaded and executed by web server ?

   a) Servlet   b) Applet

   c) Both (a) and (b)   d) Apache Tomcat

2. Answer **any five** of the following :   **10**

   1) Define anonymous inner class.

   2) Difference between forward() and include() of RequestDispatcher.

   3) What is session ?

   4) What is java beans ?

   5) What is Event Delegation ?

   6) What is an Applet ?

3. A) Answer **any two** of the following :   **6**

     1) What is JDBC ? Explain architecture of JDBC.

     2) Differentiate between GenericServlet and HttpServlet.

     3) Explain types of EJB.

  B) Explain JSP life cycle.   **4**

4. Answer **any two** of the following :   **10**

  1) Write a program to establish connection and retrieve data from student database (Assume oracle database).

  2) Explain servletConfig and servletContext with suitable examples.

  3) Write a program to create simple servlet for handling HTTP POST request.

5. Answer **any two** of the following :   **10**

  1) Write a JSP that demonstrate use of <jsp:useBean>tag.

  2) What is Layout Manager ? Explain different types of Layout Manager.

  3) Explain JSP elements in detail.

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SLR-W – 258

B.Sc. – III (Semester – VI) Examination, 2016
PHYSICS (Special Paper – XV) (Old)
Quantum Mechanics and Astrophysics

Day and Date : Monday, 28-3-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

N.B. : i) **All** questions are **compulsory**.
     ii) Figures to the **right** indicate **full** marks.
     iii) **Use** of log table or scientific calculator is **allowed**.
     iv) Draw **neat** diagrams **wherever** necessary.

1. Select correct alternative   **10**

   i) Heisenberg's uncertainty principle is given by

     a) $\Delta p \, \Delta x = h$ b) $\Delta p . \Delta x = \hbar$ c) $\Delta p . \Delta x \leq \hbar$ d) $\Delta p . \Delta x \geq \hbar$

   ii) The state of universe when all the matter in the universe is concentrated in a small region is called

     a) ylem   b) nucleus   c) big bang   d) cosmology

   iii) The separation between two successive energy levels in linear harmonic operator is

     a) $\hbar \omega$ b) $\dfrac{\hbar \omega}{2}$ c) $\dfrac{3\hbar\omega}{2}$ d) $\dfrac{5\hbar\omega}{2}$

   iv) About 90% of matter in interstellar medium contains

     a) dust   b) helium   c) hydrogen   d) oxygen

   v) The normalization condition of the wave function ψ is given by

     a) $\displaystyle\int_{-\infty}^{\infty} \Psi^* \Psi \, dv = 0$ b) $\displaystyle\int_{-\infty}^{\infty} \Psi^* \Psi \, dv = 1$

     c) $\displaystyle\int_{-\infty}^{\infty} \Psi^* \Psi \, dv \leq 1$ d) $\displaystyle\int_{-\infty}^{\infty} \Psi^* \Psi \, dv \geq 1$

vi) Eigen values of parity operator are

   a) ± 4 b) ± 1 c) ± 2 d) ± 3

vii) A star in the process of formation is called a

   a) red giant   b) white dwarf   c) proto star   d) none of these

viii) Energy of a particle which is moving in one dimensional rigid box is proportional to

   a) length of box

   b) reciprocal of length of box

   c) reciprocal of square of length of box

   d) reciprocal of squareroot of length of box

ix) The front view of galaxy exhibits _____ arms.

   a) Spiral   b) Disc   c) Spherical   d) Circular

x) The eigen value of L^2 is given by

   a) $\langle L^2 \rangle = (m+1)\hbar$ b) $\langle L^2 \rangle = -l(l+1)\hbar^2$

   c) $\langle L^2 \rangle = -(m+1)\hbar$ d) $\langle L^2 \rangle = l(l+1)\hbar^2$

2. Answer **any five** of the following :   **10**

  i) What are sun spots ?

  ii) Find the eigen value of the operator d/dx for the function e^x.

  iii) Explain zero point energy.

  iv) Define operator in quantum mechanics.

  v) Explain steady state universe.

  vi) Explain nuclear fusion reaction.

3. A) Attempt **any two** of the following :   **6**

  i) Give the physical significance of ψ.

  ii) Explain the quantum numbers n, l, ml and ms.

  iii) What is Hubble law ? Define Hubble constant.

 B) Derive Schrodinger's time independent wave equation for matter wave.   **4**

4. Answer **any two** of the following : **10**

i) Explain supernova explosion and formation of neutron star.

ii) Obtain Eigen values of operator Lz.

iii) Explain two cosmological tests to support big bang theory.

5. Answer **any one** of the following : **10**

i) What are the essential features of solar system ? Discuss the condensation theory and give the supporting points to it.

ii) Using steady state Schrodinger wave equation derive the energy eigen values for the motion of a particle in three dimensional rigid box.

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Seat
No.

B.Sc. – III (Semester – VI) (Old) Examination, 2016
CHEMISTRY
Organic Chemistry (Special Paper – XV)

Day and Date : Monday, 28-3-2016   Total Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) **All** the questions are **compulsory**.
2) **Draw** neat diagrams and give equations **wherever** necessary.
3) Figures to **right** indicate **full** marks.

1. Choose the most correct alternative for **each** of the following.   **10**

   1) The basic requirement for colouration of the compound is _____ group.

      a) chromophore   b) auxochrome   c) bathochrome   d) hypsochrome

   2) For chain shortening of aldose carbohydrate _____ reaction is used.

      a) Kiliani Synthesis   b) Weerman
      c) Haworth   d) Hudson

   3) Quinoline on catalytical hydrogenation with H_2 – pt/CH_3COOH gives _____

      a) 1, 2 dihydroquinoline   b) 1, 2, 3, 4 tetrahydroquinoline
      c) decahydroquinoline   d) none of these

   4) Thyroxine on catalytical reduction _____ compound.

      a) tyrosine   b) quinol   c) thyronine   d) oxalic acid

   5) Glucose on complete reduction with HI/Red-p gives _____

      a) glucaric acid   b) n-hexane
      c) n-hexanoic acid   d) glucose penta acetate

   6) Which of the following one drug is used as an antimalerials ?

      a) Paludrine   b) Isoniozide   c) Tolbutamide   d) Ibuprofen

7) What is the product of the following reaction ?

a) 3-nitropyrrole | b) 2-nitropyrrole

c) 2, 3-dinitropyrrole | d) 2, 3, 4, 5 tetra nitropyrrole

8) Orange IV dye is _____ type of dye

a) a2a   b) TPM   c) phthalein   d) sulphur

9) _____ is insoluble both in fat and water

a) Vit.-K   b) Vit.-B1   c) Vit.-H   d) Vit.-D

10) Among the following which is a antidiabetic agent ?

a) isoniazid   b) ethambutol   c) tolbutamide   d) Paludrine

2. Answer **any five** of the following.   **10**

  i) What are agrochemicals ? Give structure and uses of Methoxychlor.

  ii) What are vitamins ? Give the structure of Vitamin- A.

  iii) Explain the application of vat dyes.

  iv) Give the structural formula and uses of lactose.

  v) Predict the products of the following reaction.

  vi) Write conversion of fructose to glucose.

3. A) Answer **any two** of the following. **6**

   i) Explain the basic and acidic character of pyrrole.

   ii) Explain the Kiliani's Synthesis.

   iii) Explain the Synthesis of Malechite green.

   B) Define CNS drugs . Give the synthesis and uses of phenobarbitone drug. **4**

4. Answer **any two** of the following. **10**

   i) What are antibiotics drugs ? Give the synthesis of chloromycetin.

   ii) Give the synthesis and uses of Indole-3-acetic acid.

   iii) Discuss the Skraup's synthesis. What is the action of

   i) SO_3 & H_2SO_4 and

   ii) Sodamide on the quinotine.

5. Answer **any two** of the following. **10**

   i) What are dyes ? Give the classification of dyes on the basis structure/ constitution with examples.

   ii) Discuss the structure of Adrenaline on the basis of analytical method.

   iii) Discuss the ring structure of glucose. Prove the size of the oxide ring structure of glucose by methylation method.

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Seat No.

B.Sc. (Part – III) (Semester – VI) (Old) Examination, 2016
ZOOLOGY (Special Paper – XV)
(Molecular Biology and Biotechnology)

Day and Date : Monday, 28-3-2016   Max. Marks : 50
Time :10.30 a.m. to 12.30 p.m.

Instructions : 1) *All* questions are *compulsory.*
2) Figures to *right* indicate *full* marks.
3) *Draw* neat labeled diagrams *wherever* necessary.

1. Complete the sentence selecting appropriate answer :   **10**

   1) In m-RNA, m stands for
      a) Microbial   b) Mitochondrial
      c) Messenger   d) Mini

   2) Hybridoma technique was discovered by
      a) Crick   b) Jacob and Monad
      c) Kohler and Milstein   d) Alwine

   3) _____ enzyme is involved in transcription.
      a) DNA Polymerase   b) DNA Ligase
      c) RNA polymerase   d) Reverse Transcriptase

   4) DNA finger printing was invented by
      a) Watson   b) Alec Jeffrey
      c) Crick   d) Jacob

   5) Process of synthesis of protein on ribosome is called as
      a) Transcription   b) Replication
      c) Metabolism   d) Translation

   6) ELISA technique is used for the detection of
      a) Antigens   b) DNA
      c) RNA   d) Carbohydrates

   7) The main use of PCR is making
      a) Multiple copies of DNA   b) Multiple copies of RNA
      c) Antigen   d) Antibody

P.T.O.

8) _____ is the application of DNA probe.
   a) Hybridoma
   b) DNA finger printing
   c) Monoclonal antibodies
   d) Chromatography

9) Long form of ELISA is
   a) Enzyme Linked Ionic Assay
   b) Enzyme Listed Immuno Assay
   c) Enzyme Linked Immuno Sorbent Assay
   d) Energy Linked Immuno Sorbent Assay

10) Two strands of the DNA are linked with each other by _____ bond.
    a) Peptide
    b) Sulpha hydral
    c) Glucosidic
    d) Hydrogen

2. Write short notes on following (**any five**) : **10**
   i) Northern blotting technique.
   ii) Restriction enzyme.
   iii) DNA Ligase.
   iv) Non-sense codon.
   v) Human Genome.
   vi) t-RNA.

3. A) Answer **any two** of the following : **6**
   i) Enlist the applications of Biotechnology.
   ii) Post-transcriptional changes in RNA.
   iii) Explain Wobble hypothesis.

   B) Describe technique of DNA finger printing. **4**

4. Answer **any two** of the following : **10**
   i) Give an account of chain elongation step in protein synthesis.
   ii) Describe the Southern blotting.
   iii) Explain process of conjugation in bacteria.

5. Answer **any one** of the following : **10**
   i) Enlist the properties of genetic code. Describe codon assignments.
   ii) Give an account of Watson and Crick double stranded model of DNA molecule.

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SLR-W – 262

Seat
No.

B.Sc. III (Semester – VI) Examination, 2016
Special Paper – XV : MATHEMATICS (Old)
Partial Differential Equation

Day and Date : Monday, 28-3-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) ***All*** questions are ***compulsory***.

2) Figures to the ***right*** indicate ***full*** marks.

1. Select the correct alternative for each of the following :   **10**

1) The equation $\dfrac{\partial^2 z}{\partial x^2} = \left(1 + \dfrac{\partial z}{\partial y}\right)^{1/2}$ is of order

   a) 1   b) 2

   c) 3   d) None of these

2) The equation $(2x + 3y)p + 4xq - 8pq = x + y$ is

   a) linear   b) non-linear

   c) quasi-linear   d) semi-linear

3) The partial differential equation obtained by eliminating arbitrary constants a and b from $4z = [ax + (y/a) + b]^2$ is

   a) $Z = \left(\dfrac{\partial z}{\partial x}\right)\left(\dfrac{\partial z}{\partial y}\right)$ b) $Z = \dfrac{\partial z}{\partial x} + \dfrac{\partial z}{\partial y}$

   c) $\dfrac{\partial z / \partial x}{\partial z / \partial y} = Z$ d) None of these

4) The partial differential equation obtained by eliminating the function f from

   $Z = y^2 + 2f\left(\dfrac{1}{x} + \log y\right)$ is

   a) $x^2 \dfrac{\partial z}{\partial x} = zy^2 - y\, \partial z / \partial y$ b) $x^2 \left(\dfrac{\partial z}{\partial x}\right)^2 = zy^2 + y\, \partial z / \partial y$

   c) $x \left(\dfrac{\partial z}{\partial x}\right)^2 = zy - y^2 \dfrac{\partial z}{\partial y}$ d) None of these

P.T.O.

5) If in a given function the number of arbitrary constants is less than the number of independent variables, then the elimination of arbitrary constants usually gives rise to

   a) a unique partial differential equation of order one

   b) a partial differential equation of order usually greater than one

   c) more than one partial differential equation of order one

   d) none of these

6) The general solution of the partial differential equation $p+q = 1$ is

   a) $\phi(x/z, y/z) = 0$ b) $\phi(x + y, x + z) = 0$

   c) $\phi(xy, xz) = 0$ d) $\phi(x - y, x - z) = 0$

7) A solution of a partial differential equation which contains no arbitrary constants is

   a) Particular solution   b) General solution

   c) Primitive   d) None of these

8) The first order partial differential equations $p = P(x, y)$ and $q = Q(x, y)$ are compatible if f

   a) $\dfrac{\partial P}{\partial x} \cdot \dfrac{\partial Q}{\partial x} = 1$ b) $\dfrac{\partial P}{\partial x} + \dfrac{\partial Q}{\partial x} = 0$

   c) $\dfrac{\partial P}{\partial x} + \dfrac{\partial Q}{\partial x} = 1$ d) $\dfrac{\partial P/\partial x}{\partial Q/\partial x} = 1$

9) The solution of the equation $f(p,q) = 0$ is of the form

   a) $Z = ax + by + c$ b) $Z = ax + by + ab$

   c) $Z = x + ay$ d) none of these

10) The solution of a reducible non-homogeneous linear partial differential equation with constant coefficients $F(D, D')Z = 0$ corresponding to each non-repeated factor $bD - aD' - C$ is

   a) $e^{cx/a} \phi(by + ax)$ b) $e^{cx/a} \phi(by)$

   c) $e^{cx/b} \phi(by + ax)$, if $b \neq 0$ d) none of these

2. Attempt **any five** : **10**

   a) Form a partial differential equation by eliminating arbitrary constants a and b from $z = ax + by + ab$

   b) Eliminate arbitrary function f from $z = f(x^2 - y^2)$

   c) Show that $F(D, D')e^{ax+by} = F(a, b)e^{ax+by}$

   d) Define the term singular solution.

   e) Solve $(D^2 - D')Z = 0$

   f) Solve $(D^2 + 3DD' + 2D'^2)z = 0$

3. A) Attempt **any two** : **6**

   a) Explain how to solve Clairants equation using charpits method.

   b) Solve $(D^2 - D'^2 + D - D')z = e^{2x+3y}$

   c) Solve $(D^2 - 6DD' + 9D'^2)z = \tan(y + 3x)$

   B) Explain the method of finding partial differential equation by the elimination of arbitrary function ϕ from the equation $\phi(u, v) = 0$, where u and v are functions of x, y and z. **4**

4. Attempt **any two** : **10**

   a) Explain the Lagranges method of solving $Pp + Qq = R$ when P, Q and R are functions of x, y, z.

   b) Find the integral surface of the partial differential equation
   $(x - y)p + (y - x - z)q = z$ through the circle $z = 1$, $x^2 + y^2 = 1$.

   c) Solve $(D - D' - 1)(D - D' - 2)z = \sin(2x + 3y)$.

5. Attempt **any one** : **10**

   a) Prove that $\dfrac{1}{(bD - aD')^n}\phi(ax + by) = \dfrac{x^n}{b^n n!}\phi(ax + by)$.

   b) i) Find the complete integral and singular integral of $Z = px + qy + \log pq$.

   ii) Slove $(p^2 + q^2)y = qz$.

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Seat No.

B.Sc. – III (Semester – VI) Examination, 2016
STATISTICS (Special Paper – XV) (Old)
Limit Theorems, Reliability and Queuing Theory

Day and Date : Monday, 28-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : i) **All** questions are **compulsory** and carry **equal** marks.
ii) **Use** of scientific calculators and statistical tables is **allowed**.

1. Choose most correct answer from the following.   **10**

   i) If $Y_1 < Y_2 < ... < Yn$ is an order statistic from a distribution with pdf f(x) and CDF F(X) then probability distribution of Yr can be obtained using
      a) Concept of multinomial distribution
      b) Concept of first definition of derivative
      c) Both a and b
      d) Neither a nor b

   ii) For a continuous distribution Chebysheve's inequality (C.I.) can be stated as
      a) $P\left[|X - E(X)| \geq c\right] \leq c^2$

      b) $P\left[|X - E(X)| \geq c\right] \leq \dfrac{V(X)}{c^2}$ provided $V(X) < C^2$

      c) $P\left[|X - E(X)| \leq c\right] \geq \dfrac{V(X)}{c^2}$ provided $V(X) < C^2$

      d) $P\left[|X - E(X)| \leq c\right] \geq c^2$

   iii) If $Xn \xrightarrow{p} X$ then $g(Xn) \xrightarrow{p} g(X)$ if g (.) is _____
      a) pdf   b) CDF
      c) any continuous function of X   d) None of these

   iv) If $Xn \xrightarrow{p} X$ then _____

      a) $k.Xn \xrightarrow{p} k.X$ b) $kXn \xrightarrow{p} k$

      c) $kXn \xrightarrow{p} X$ d) None of these

v) A two out of three system works if _____
   a) only 2 components are working
   b) at least 2 components are not working
   c) at least 1 components is working
   d) at least 2 component are working

vi) Structure function of parallel system of two components is $\phi(x)$ =
   a) $1 - (1 - x_1)(1 - x_2)$ b) $1 - x_1 x_2$
   c) $x_1 x_2$ d) $(1 - x_1)(1 - x_2)$

vii) Let $\{Xn, n > 0\}$ be a sequence of iid r.vs. each with mean μ and variance σ^2.
   If $Sn = X_1 + X_2 + ... + Xn$, then the distribution of Z is N (0, 1) as $n \to \infty$ if Z =

   a) $\dfrac{(S_n - \mu)}{\sigma/\sqrt{n}}$ b) $\dfrac{(S_n - n\mu)}{\sigma\sqrt{n}}$ c) $\dfrac{(S_n - n\mu)}{\sigma/\sqrt{n}}$ d) $\dfrac{(S_n - \mu)}{n\sigma^2}$

viii) If $\{Xn, n > 0\}$ be a sequence of iid p(1) r.vs. then $\sqrt{n}(\overline{x_n} - 1)$ has _____
   distribution.
   a) P (1)   b) P (n)   c) N (0, 1)   d) None of these

ix) In usual notations traffic intensity is given by

   a) $\dfrac{\lambda}{\mu}$ b) $\dfrac{\mu}{\lambda}$ c) λ d) μ

x) In M/M/1 : ∞/FCFS model the queue discipline is
   a) first in last out   b) first in first out
   c) last in first out   d) last in last out

2. Attempt **any five** from the following :   **10**

   a) Define minimal cut set.

   b) State Weak Law of Large Numbers (WLLN) and show it does not hold good
      for Cauchy distribution.

   c) If X is B (10, 0.2) then using C.I. obtain upper bound for $P\left[\left|\dfrac{x}{10} - \dfrac{2}{10}\right| > 2\right]$.

   d) In usual notations state (only) the joint p.d.f. of rth and s^{th} order statistic.

   e) Define service rate μ. If μ = 10 per hour then find average time required to serve
      one customer.

   f) Define a queue discipline.

3. A) Attempt **any two** from the following : **6**

    a) Define reliability function R(t) and hazard rate $\lambda(t)$ and show that

$$\lambda(t) = \frac{-R'(t)}{R(t)}.$$

    b) Obtain reliability function of a series system of 3 components.

    c) If {Xn} is a sequence of i.i.d. N (μ, σ^2) r.vs. then show that $\overline{x}_n \xrightarrow{p} \mu$ as $n \rightarrow \infty$.

3. B) State any four assumptions of M/M/1 : ∞/FCFS model. **4**

4. Attempt **any two** from the following : **10**

    A) State and prove central limit theorem for a sequence of i.i.d. r.vs.

    B) Show that hazard rate of a series system of components having independent life times is summation of component hazard rates.

    C) Define order statistic and obtain p.d.f. of rth order statistic.

5. Attempt **any two** from the following : **10**

    A) Find the distribution of sample median if a random sample of odd size is taken from a distribution with p.d.f. f(x) and CDF F(x).

    B) Let Xi are i.i.d. P(0.02) r.v.s. Let $S = S_{100} = \sum X_i$. Use CLT to evaluate P [S $\geq$ 3].

    C) Obtain the distribution of arrivals in queuing system.

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Seat No.

B.Sc. – III (Semester – VI) (Old) Examination, 2016
GEOLOGY (Special Paper – XV)
Phanerozoic Stratigraphy of India

Day and Date : Monday, 28/3/2016　　　　　　　　　　Total Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Figures to the **right** indicate **full** marks.
　　　　　　　　3) Draw neat labelled diagrams **wherever** necessary.

1. Fill in the blanks with correct answer from given options :　　　　**10**

　　1) Deccan Traps are younger than _____

　　　　a) Laterites　　　　　　　　b) Intertrappeans

　　　　c) Lametas and Bagh beds　　d) None of these

　　2) Gondwana sediments were deposited in _____

　　　　a) Geosynclines　b) Lakes　　c) Trough faults　　d) Estuaries

　　3) The lowest series of Gondwana system is _____

　　　　a) Talchir　　　b) Umia　　　c) Jabalpur　　　d) Rajmahal

　　4) The middle and upper Jurassic forms _____

　　　　a) Rajmahal　　　　　　　　b) Jurassic of Cutch

　　　　c) Spiti　　　　　　　　　　d) Salt range

　　5) Which one of the following series includes in Jurassic of Cutch ? _____

　　　　a) Katrol　　　　b) Boulder bed　c) Rikba　　　d) Barren measures

　　6) Which one of the following Cretaceous rocks of south India is youngest ?

　　　　a) Utatur　　　　b) Trichuiopoly　c) Ariyalur　　d) None of these

　　7) The fossils of Physa occur in _____ beds underlying Deccan Traps.

　　　　a) Umia　　　　b) Infratrappean　c) Chari　　　d) None of these

　　8) Age of Deccan Traps is _____

　　　　a) Upper Cretaceous to Eocene　　b) Upper Cretaceous to Oligocene

　　　　c) Upper Cretaceous to Miocene　　d) Upper Cretaceous to Pliocene

9) 'Chikkimlimestone' belongs to _____

   a) Eocene rocks of Kashmir

   b) Cretaceous of Spiti

   c) Pre Cambrians of Sikkim

   d) Jurassics of Spiti

10) The main boundary fault separates _____

   a) Vindhyans and Aravallies

   b) Siwaliks and Tertiaries

   c) Siwaliks and Aravallies

   d) Siwaliks and Archaeans

2. Answer **any five** of the following :   **10**

   i) The fossils of reptiles like Dinosaur are found in which stage of Cretaceous of south India ?

   ii) What is the age of Neobolus beds ?

   iii) On which rock Cambrian strata of Spiti lies over ?

   iv) What is the age of Siwalik system ?

   v) Describe "Neobolus beds".

   vi) Give the age of the Saline Series/Salt Marl.

3. A) Answer **any two** of the following :   **6**

   i) Describe in short, climate during Gondwana.

   ii) Explain economic importance of Damuda Series.

   iii) Describe Barren measures.

   B) Write a brief essay on the economic importance of Deccan Traps.   **4**

4. Answer **any two** of the following :   **10**

   i) Describe in brief with stratigraphic sequence and lithology of Panchet series.

   ii) Describe in detail Kiotolimestones.

   iii) Describe in brief with lithology and fauna of Lameta beds.

5. Answer **any two** of the following :   **10**

   i) Describe in brief with stratigraphic sequence and lithology of Deccan Traps.

   ii) Describe the nature of Siwalik deposits.

   iii) Explain nature of 'Main Boundary Fault'.

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SLR-W – 265

B.Sc. – III (Semester– VI) Examination, 2016
MICROBIOLOGY (Special Paper – XV) (Old)
Environmental Microbiology

Day and Date : Monday, 28-3-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
               2) Draw **neat** labelled diagram **wherever** necessary.
               3) Figures to the **right** indicate marks.

1. Rewrite the following sentences by selecting correct alternatives :   **10**

   i) Study of animals in germ free environment is known as
     a) Gnotobiology   b) Zoology   c) Geology   d) Biology

   ii) Pollutant from a motor car which affect nervous system is
     a) Na   b) Pb   c) Hg   d) SO_2

   iii) The photo chemical smog is due to
     a) Carbon dioxide   b) Sulphur dioxide
     c) Nitrogen oxide   d) H_2S

   iv) _____ protect us from harmful effects of ultraviolet radiations.
     a) Smog   b) Clouds   c) CO_2 d) Ozone

   v) Lichens are described as the indicators of
     a) Air pollution   b) Water pollution
     c) Xerophytic succession   d) Mesophytic succession

   vi) Hiroshima-Nagasaki tragedy is a case of _____ pollution.
     a) Soil   b) Radioactive   c) Air   d) Oil

   vii) Oil and grease are common in waste from _____ industry.
     a) Sugar   b) Dairy   c) Textile   d) Paper

viii) Process of toxic removal by using plants is called
  a) Biotransformation
  b) Bioaccumulation
  c) Biomagnification
  d) Phytoremediation

ix) Increase in the temperature of earth surface due to concentration of CO_2 is called as
  a) Acid rain
  b) Green house effect
  c) Eutrophication
  d) Smog

x) The Taj Mahal is under the threat of being destroyed due to
  a) Radioactive fall out
  b) Air pollutants released from oil refinery of Mathura
  c) Degradation of marble by high temperature
  d) Flood in Yamuna river

2. Answer **any five** of the following : **10**
  i) Define term BOD.
  ii) What is potable water ?
  iii) Define Bioaerosal.
  iv) Give significance of ozone.
  v) Give sources of air pollution.
  vi) Define gnotobiology.
  vii) What is bioleaching ?

3. A) Answer **any two** of the following : **6**
    i) Give significance of environmental legislation.
    ii) Write a note on in-situ leaching.
    iii) Explain microbially enhanced oil recovery.
  B) Write a note on germ free animals. **4**

4. Answer **any two** of the following : **10**
  i) Explain bioleaching of copper and uranium.
  ii) Explain treatment of biomedical waste.
  iii) Explain routine bacteriological analysis of water.

5. Answer **any two** of the following : **10**
  i) What is Eutrophication ? Explain various control measures to control eutrophication.
  ii) Explain 'Sugar industry as zero waste technology'.
  iii) Write an essay on biological safety.

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Seat
No.

B.Sc. – III (Semester – VI) (Old) Examination, 2016
ELECTRONICS (Special Paper XV)
Embedded System Design

Day and Date : Monday, 28-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. :   1) **All** questions are **compulsory.**

2) Figures to the **right** indicate **full** marks.

3) Neat and labelled diagram should be drawn **wherever** necessary.

4) **Use** of log table and calculators are **allowed**.

1. Select alternatives from the following :   **10**

   i) Humidity is always expressed in _____ unit.

      a) °C   b) °K   c) RH%   d) Joules

   ii) The data range of float variable is _____ bytes.

      a) 2   b) 4   c) 3   d) 1

   iii) The base element of an array has index _____

      a) Zero   b) One   c) Ten   d) Eight

   iv) _____ of the timer is checked to identify the completion of the count.

      a) EI flag   b) TF flag   c) OV flag   d) RI flag

   v) Which of the following is the humidity sensor ?

      a) AD 590   b) SY-HS-220   c) LM 35   d) AD 595

   vi) Power on reset of microcontroller 8951 is _____

      a) Active high   b) Active low

      c) Always zero   d) None of these

   vii) For programming of microcontroller 8951 with Flash magic tool requires _____ file.

      a) .Exe   b) .Hex   c) .bin   d) .obj

viii) _____ of the following line driver is used for In-system programming of the 8951 micro controller.

a) Max 232   b) RS 232   c) Max 448   d) Max 248

ix) To communicate from microcontroller to computer, the standard band rate is _____

a) 5600   b) 6600   c) 8600   d) 9600

x) If dock frequency of microcontroller is 12 MHz, then input frequency for timer is _____ MHz.

a) 12   b) 1   c) 8   d) 6

2. Answer **any five** of the following :   **10**

i) Draw circuit diagram for Reset circuit.

ii) What is the need of operating system in embedded system ?

iii) What do you mean by data types ?

iv) Define the terms constants and variable.

v) The temperature sensor has coefficient 10mv/°C. Calculate emf produced by this sensor for 55°C.

vi) Give structure of embedded C program.

3. A) Answer **any two** of the following :   **6**

i) What do you mean by superloop ?

ii) Write embedded C program to generate triangular wave.

iii) Enlist the characteristics of an embedded system.

B) Draw circuit diagram to interface DAC to microcontroller.   **4**

4. Answer **any two** of the following :   **10**

i) Describe the steps involved in development of program with Kiel microvision.

ii) Describe generation of delay time by using timer $\perp$.

iii) What do you mean by user's defined functions in C language ?

5. Answer **any one** of the following :   **10**

i) Draw block diagram of hardware of an embedded system to measure humidity of the environment.

ii) Write embedded C program to generate Sawtooth waveform.

_____

SLR-W – 268

B.Sc. (Part – III) (Semester – VI) (Old) Examination, 2016
PHYSICS (Special Paper – XVI)
Electronics and Computer Programming

Day and Date : Tuesday, 29-3-2016　　　　　　　　　　Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) ***All*** questions are ***compulsory***.
　　　　　　　2) *Figures to the **right** indicate **full** marks.*
　　　　　　　3) ***Use*** *of calculator or log table is **allowed**.*
　　　　　　　4) ***Neat*** *diagrams must be drawn **wherever** necessary.*

1. Select the correct alternative from the following :　　　　　　**10**

　i) The ideal input impedance of Op-Amp is
　　a) infinite　　　b) high　　　c) negative　　d) zero

　ii) _____ is the ratio of change in input offset current to the change in temperature.
　　a) Input offset current drift　　　b) Input offset voltage drift
　　c) Slew rate　　　　　　　　　　d) Common mode input impedance

　iii) In an astable multivibrator using 555 timer IC, the capacitor always charges between
　　a) 0 and V_{CC}　　　　　　　b) 0 and 2/3 V_{CC}
　　c) 1/3 V_{CC} and 2/3 V_{CC}　　d) 0 and 1/3 V_{CC}

　iv) The frequency of unsymmetrical rectangular wave form of an astable multivibrator using 555 timer IC is given by
　　a) 0.70/RC　　b) 1.38 RC　　c) 0.69 RC　　d) $\dfrac{1.44}{C(R_A + 2R_B)}$

　v) A p-n-p-n diode is fabricated from
　　a) Germanium (Ge) only
　　b) Silicon (Si) only
　　c) Germanium (Ge) and Silicon (Si)
　　d) Gallium arsenide (GaAs)

　vi) One Megabyte memory has _____ kilobyte of memory.
　　a) 2　　　　　b) 1000　　　c) 1024　　　d) 948

P.T.O.

vii) Data is temporary held in
   a) Main memory
   b) Secondary unit
   c) Control unit
   d) Monitor

viii) The meaning of _____ can not be changed.
   a) Identifier
   b) Keyword
   c) Variable
   d) Constant

ix) _____ is a group of characters enclosed in double quotes.
   a) String
   b) Character
   c) Float
   d) Real

x) Built in multiple branch decision statement is called
   a) if
   b) if – else
   c) nested if – else
   d) switch

2. Answer **any five** of the following :   **10**

   i) State different characteristics of ideal Op-Amp.

   ii) Define the Duty cycle of timer IC555.

   iii) What do you mean by Holding current of SCR ?

   iv) Differentiate between computer Hardware and Software.

   v) Explain insertion and extraction operators in C++.

   vi) What is Flow – chart ?

3. A) Answer **any two** of the following :   **6**
      i) How SCR can made TURN-ON by different method.
      ii) Define the term operating system. Explain different functions of operating system.
      iii) Describe in brief lower level and higher level languages.

   B) Explain the use of IC555 for linear Ramp Monostable.   **4**

4. Answer **any two** of the following :   **10**

   i) How a speed of a D.C. motor is controlled by using SCR ?

   ii) Give an account of IC555 as astable multivibrator.

   iii) Explain increment and decrement operators in C++.

5. Answer **any one** of the following :   **10**

   i) Discuss the Op-Amp as inverting amplifier and non-inverting amplifier.

   ii) What are the different looping structures in C++ ? Give syntax and suitable programs.

SLR-W – 269

B.Sc. – III (Semester – VI) (Old) Examination, 2016
CHEMISTRY (Special Paper – XVI)
Analytical and Industrial Organic Chemistry

Day and Date : Tuesday, 29-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
          2) Figures to the **right** indicate **full** marks.
          3) **Draw** neat labelled diagrams and give equations **wherever** necessary.

1. Select the most correct alternative from among those given below :   **10**

   1) In textile industry _____ is used as a wetting and scouring agent of raw wool.

      a) Teepol   b) Fat

      c) Phenol   d) Deriphat

   2) Polymerisation of 1, 3-butadiene and styrene forms _____ rubber.

      a) Natural   b) Buna-S

      c) Buna-N   d) Polyethylene

   3) Power alcohol used as a petrol substitute is _____

      a) 80% alcohol mixture + 20% petrol

      b) 60% alcohol mixture + 40% petrol

      c) 50% alcohol mixture + 50% petrol

      d) 20% alcohol mixture + 80% petrol

   4) Reactive dyes fix on fibres by _____ bonding.

      a) Ionic   b) Electrovalent

      c) Covalent   d) Co-ordinate

5) Green chemistry is defined as designing and development of the chemical processes which _____

    a) Reduce the pollution

    b) Use less energy

    c) Yield more product with lesser bye-products

    d) All the above three

6) The principle used in column chromatography is based on _____

    a) Partition

    b) Selective adsorption

    c) Capillary action

    d) None of these

7) Hard soap is a salt of fatty acid and _____

    a) Sodium hydroxide

    b) Potassium hydroxide

    c) Caustic potash

    d) All the above

8) Singeing is a process of _____

    a) Bleaching the fibres

    b) Removing starch from the cloth

    c) Removing protruding fibres from the cloth surface

    d) Removing wax and tallow from the fibres

9) Biocatalytic reactions are catalysed by _____

    a) Salts   b) Enzymes   c) Alcohols   d) Zeolites

10) In gas chromatography _____ gas is preferable mobile phase.

    a) CO   b) O_2 c) SO_2 d) He

2. Answer **any five** of the following :   **10**

    i) Give preparation and uses of polyethene.

    ii) Explain anionic detergents.

    iii) What is desizing ? Why is it necessary ?

    iv) Write the advantages of vacuum evaporator in concentration of sugar juice.

    v) What are microwave assisted reactions ? Give example.

    vi) Explain the term rate of flow (R_f) value in chromatography.

3. A) Answer **any two** of the following : **6**

   i) What are zeolites ? Explain their use in Friedel Craft's alkylation reaction.

   ii) Explain elastomers, thermoplastics and thermosettings.

   iii) Define 'detergents'. How are they classifieds ?

  B) Discuss the experimental technique of paper chromatography. **4**

4. Answer **any two** of the following : **10**

   i) With a neat sketch of mill house, explain the extraction of sugar juice from sugarcane.

   ii) Write a brief note on raw materials used in the manufacture of soap.

   iii) Explain the principle and process of fabric bleaching by sodium hypochlorite.

5. Answer **any two** of the following : **10**

   i) Give the synthesis and uses of bakelite resin.

   ii) Draw the line diagram of gas chromatographic apparatus and explain its components.

   iii) Describe the process of manufacture of ethyl alcohol by the fermentation of molasses by yeast cells.

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SLR-W – 270

B.Sc. – III (Semester – VI) Examination, 2016
BOTANY (Old) (Special Paper – XVI)
Molecular Biology and Biotechnology

Day and Date : Tuesday, 29-3-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions :   i) **All** questions are **compulsory**.

       ii) Figures to the **right** indicate **full** marks.

       iii) Draw **neat** and labelled diagrams **wherever** necessary.

1. Rewrite the following sentences choosing the correct alternatives.   **10**

   1) Which of the following nitrogen base is absent in DNA

     a) Uracil   b) Thymin   c) Cytosine   d) Adenine

   2) Destruction of DNA at high temperature is called as

     a) DNA renaturation   b) DNA denaturation

     c) DNA Replication   d) DNA sequencing

   3) Operon concept was putforth by sir

     a) Jacob and Monad   b) Jacob and Wolleman

     c) Jacob and Huberland   d) Khoranu and Lederberg

   4) The _____ enzyme act as splicing the DNA

     a) Helicase   b) Gyrase

     c) Restriction endonuclease   d) Pol – I

   5) The mRNA coding for more than one protein is known as

     a) r – RNA   b) cDNA

     c) Cistronic mRNA   d) Polycistronic mRNA.

   6) The forensic medicine RFLPs;DNA-finger printing for the identification of criminal _____ method used.

     a) Southern blot   b) Northern blot

     c) Western blot   d) Eastern blot

7) The human genome project was started _____ Year.

a) 1990   b) 1995   c) 2000   d) 2010

8) Plant tissue culture technique was discovered by _____ scientist.

a) Haberland 1972   b) Morkel-1972

c) De-varies 1872   d) Muller-1972

9) The cell having capacity to divisible in tissue culture is _____ called.

a) Totipotient cell   b) Mitiotic cell

c) Meiotic cell   d) None of these

10) Anther culture give _____ plants.

a) (n)   b) (2n)   c) (3n)   d) (4n)

2. Answer **any five** of the following questions.   **10**

i) Define Micro propagation

ii) What is meant by DNA library ?

iii) What is the 'B' forms of DNA ?

iv) Which plasmid present in Agrobacterium and what is their role ?

v) What is chimeric DNA ?

vi) What is western bloting technique ?

3. A) Answer **any two** of the following questions.

i) Application of genetic engineering

ii) Sketch and label the Lac-operon diagrammatically

iii) Give the full forms of DNA and its chemical composition.   **6**

B) Application of the plant tissue culture.   **4**

4. Answer **any two** of the following questions.   **10**

i) Enzymes involved in Replication Fork (Y - Fork)

ii) Write note on transgenic plants.

iii) What is PCR and its application ?

5. Answer **any two** of the following questions.   **10**

i) Describe the soma culture

ii) Describe the semiconservative model of DNA replication

iii) Describe the Lac-operon concept.

_____

Seat
No.

B.Sc. – III (Semester – VI) (Old) Examination, 2016
ZOOLOGY (Special Paper – XVI)
Biotechniques and Applied Zoology

Day and Date : Tuesday, 29-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
         2) Figures to the **right** indicate **full** marks.
         3) **Draw** neat labelled diagrams **wherever** necessary.

1. Select the appropriate answer from **each** of the following and rewrite the
   sentence: **10**

   1) _____ is good source of fish oil.
      a) Catla   b) Pompret   c) Mrigal   d) Oil Sardine

   2) Silkworm feeds on _____ leaves.
      a) Maple   b) Mango   c) Mulberry   d) Tamarind

   3) In biological control of pests _____ are used.
      a) Chemicals   b) Fumigants
      c) Pheromones   d) Biological agents

   4) _____ deals with culture and capture of fishes and crustaceans
      like lobster, crab, shrimp etc.
      a) Silviculture   b) Aquaculture   c) Apiculture   d) Pearl culture

   5) Termite is also known as _____
      a) White ant   b) Red ant   c) Black ant   d) Green ant

   6) Pearl is also called as _____
      a) Moti   b) Coral   c) Hira   d) Ratna

   7) Silk is a secretion of silkworm from its specialized
      a) Fat bodies   b) Anal horns   c) Salivary gland   d) Spiracles

8) The full form of PAGE is
   a) Poly Acrylamide Gel Electrophoresis
   b) Poly Amyl Gel Electrophoresis
   c) Poly Amide Gel Electrophoresis
   d) Poly Acyl Gel Electrophoresis

9) The Stem Cells are _____ in nature.
   a) Nutripotent   b) Totipotent   c) Pleuripotent   d) Electropotent

10) The weight of the sample is measured by _____ device.
   a) pHmeter   b) Colorimeter
   c) Balance   d) Spectrophotometer

2. Answer **any five** of the following :   **10**
   i) Spectrophotometer
   ii) Pyrilla
   iii) TLC
   iv) Cotton ball worm
   v) Silk cocoon
   vi) Organ culture.

3. A) Answer **any two** of the following :   **6**
   i) Describe the agricultural pest – rat.
   ii) Write the uses of pH meter.
   iii) Give economic importance of fish products.

   B) Describe the varieties of silkworms.   **4**

4. Answer **any two** of the following :   **10**
   i) Explain biological control of crop pests.
   ii) Describe principle and uses of colorimeter.
   iii) Write the methods of Pearl culture.

5. Answer **any one** of the following :   **10**
   A) Describe the various Crafts and Gears used in fishing.
   B) Give the principle and requirements of tissue culture laboratory. Add a note on its applications.

_____

SLR-W – 272

B.Sc. – III (Semester – VI) Examination, 2016
MATHEMATICS (Special Paper – XVI) (Old)
Graph Theory

Day and Date : Tuesday, 29-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Select the correct alternative for **each** of the following :   **10**

   1) A vertex having degree one is called _____ vertex.

      a) isolated   b) pendant   c) even   d) none of these

   2) In directed graph sum of outdegrees of vertices is _____ sum of indegrees of vertices.

      a) not equal to   b) equal to

      c) less than   d) greater than

   3) The maximum number of edges in a simple graph with n vertices is

      a) $\dfrac{n(n+1)}{2}$ b) $\dfrac{n(n-1)}{2}$ c) $\dfrac{n+1}{2}$ d) $\dfrac{n-1}{2}$

   4) The wheel graph W_n has _____ vertices and _____ edges.

      a) n + 1, n   b) n + 1, 2n   c) n, n   d) n, n + 1

   5) The graph $H(V', E')$ is called a proper subgraph of a graph G (V, E) if

      a) $V' \subset V, E' \subset E$ b) $V \subset V', E \subset E'$

      c) $V' \subset V, E \subset E'$ d) $V \subset V', E' \subset E$

   6) Complete graph $K_{m, n}$ is Euler if and only if

      a) both m and n are even   b) both m and n are odd

      c) one of m and n is even   d) none of these

7) $4F9A_{(16)} =$ _____

   a) $20377_{(10)}$ b) $20379_{(10)}$ c) $20378_{(10)}$ d) $20380_{(10)}$

8) The number of vertices in a binary tree is always

   a) even   b) infinite   c) odd   d) none of these

9) The maximum value of a single digit in any system is always _____ the value of the base.

   a) equal to   b) equal to one greater than

   c) equal to one less than   d) none of these

10) If n, e, k are number of vertices, number of edges, number of components then nullity = _____

   a) e + n + k   b) e – n – k   c) e + n – k   d) e – n + k

2. Attempt **any two** of the following :   **10**

   a) Define regular graph and draw regular graph of degree three.

   b) Define isomorphic graph.

   c) Define product of two graphs.

   d) Write one path, one trail, one walk and one cycle for the following graph
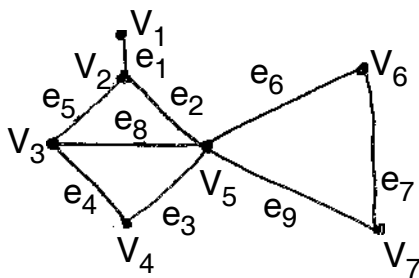
   e) Draw the diagraph G corresponding to adjacency matrix.

$$A = \begin{bmatrix} 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$$

   f) Convert $0.6_{(10)}$ to binary.

3. A) Attempt **any two** of the following : **6**

a) Find all spanning trees of the following graph
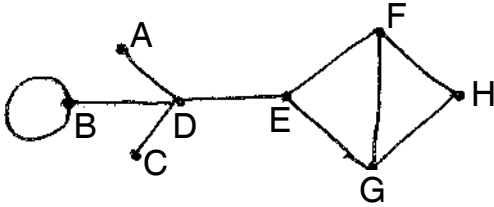
b) Convert $10486_{(10)}$ to hexadecimal number.

c) Find the adjacency matrix of the graph G.
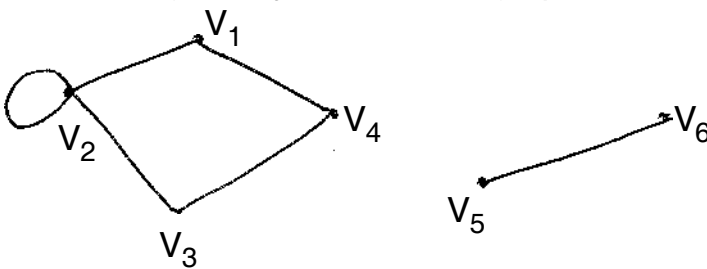
G (V, E)

B) Determine whether the following graphs are isomorphic. **4**

G

G′
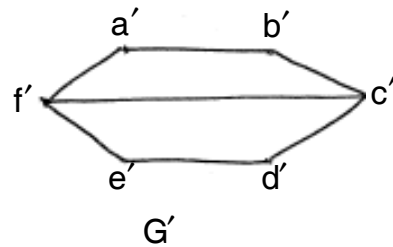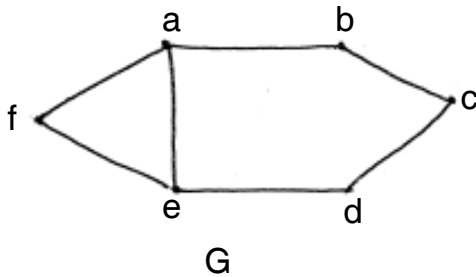
4. Attempt **any two** of the following : **10**

a) Find the minimal spanning tree of the graph G using Prim's algorithm
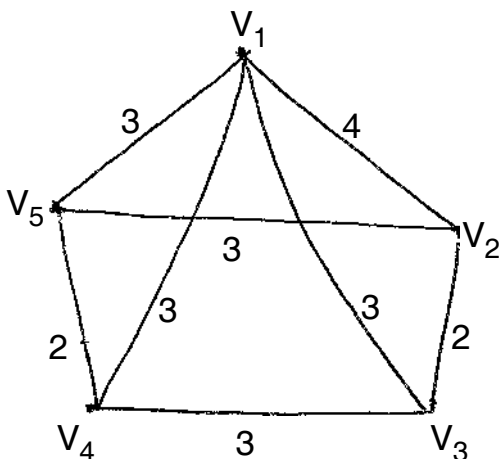
b) Convert the decimal number 257.6875 to its binary equivalent.

c) Find complement of the following graph
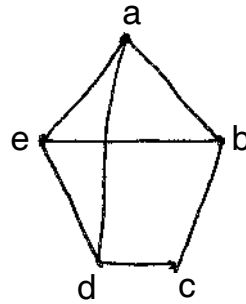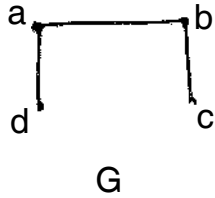
5. Attempt **any one** of the following : **10**

a) Write Dijkstra's algorith to find shortes path between two vertices in a weighted graph and then apply it to find the shortest path from vertex a to vertex f for the graph.
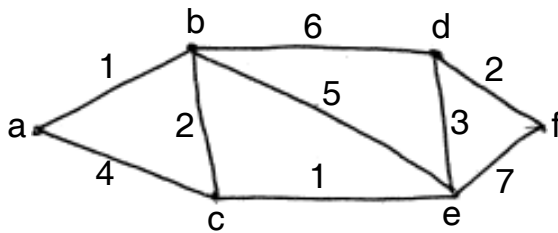
b) i) Prove that a non-empty connected graph G is Eulerian iff its vertices are all of even degree.

ii) Convert hexadecimal number FEDCE to decimal equivalent.

_____

Seat
No.

B.Sc. (Part – III) (Semester – VI) (Old) Examination, 2016
STATISTICS (Special Paper – XVI)
C-Programming

Day and Date : Tuesday, 29-3-2016   Total Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : i) **All** questions are **compulsory**.
                        ii) **Use** of simple or scientific calculator is **allowed**.
                        iii) Figures to the **right** indicate **full** marks.

1. Select most correct alternative :   **10**

    i) C is a programming language developed at
        a) Microsoft Corp., USA   b) IBM, USA
        c) Borland International, USA   d) AT and T's Bell Laboratories of USA

    ii) In C, an arithmetic expression 5/3 + 10*1.2 results in
        a) 13.66   b) 13   c) 13.67   d) 14

    iii) Which of the following is not a keyword in C ?
        a) double   b) int   c) mean   d) return

    iv) Which of the following is not true while constructing an integer constant in C ?
        a) An integer constant must have at least one digit
        b) It could be either positive or negative
        c) Default sign is positive
        d) It must have a decimal point

    v) The assignment statement x = x – b; is equivalent to
        a) x – = b;   b) x = –b;   c) b– = x;   d) none of these

    vi) The C program execution always begin with the function
        a) scanf( )   b) printf( )   c) main( )   d) return( )

    vii) Which of the following shows the correct hierarchy of arithmetic operations in C ?
        a) / + * –   b) * – / +   c) + – / *   d) * / + –

viii) If p is in integer pointer with initial value, say 3032, then after the operation
p = p + 1; the value of p will be

   a) 3032   b) 3033   c) 3034   d) none of these

ix) What is an array ?

   a) An array is a collection of variables that are of the dissimilar data type

   b) An array is a collection of variables that are of the same data type

   c) An array is not a collection of variables that are of the same data type

   d) None of these

x) Which mode is used to open a file for writing purpose ?

   a) w   b) r   c) a   d) none of these

2. Answer **any five** of the following :   **10**

  i) What is a keyword in C ?

  ii) State the rules for constructing integer constants.

  iii) How to declare variables in C ?

  iv) State the use of getchar( ) and putchar( ).

  v) What is the syntax of ternary operator ?

  vi) What is pointer in C ?

3. A) Answer **any two** of the following :   **6**

    i) Give the syntax of *if* statement.

    ii) Give the syntax of *while* statement.

    iii) What is an user defined function ?

  B) Write a C program for addition of two integers.   **4**

4. Answer **any two** of the following :   **10**

  i) Explain *switch* statement. Illustrate by one example.

  ii) Explain *while* loop. Illustrate by one example.

  iii) Write a note on array.

5. Answer **any two** of the following :   **10**

  i) Write a C program for finding factorial of a positive integer.

  ii) Write a C program for finding arithmetic mean of n values.

  iii) Explain *strlwr*( ) and *strupr*( ). Illustrate each by one example.

Seat No.

B.Sc. (Part – III) (Semester – VI) (Old) Examination, 2016
MICROBIOLOGY (Special Paper – XVI)
Medical Microbiology

Day and Date : Tuesday, 29-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions :   1) **All** questions are **compulsory**.
                     2) Figures to **right** indicate **full** marks.

1. Choose the correct alternative and rewrite the sentence again :   **10**

   1) Helicobacter pylori causes _____
      a) Gastric lymphoma   b) Gastric and duodenal ulcer
      c) Hyperacidity   d) All of these

   2) *Escherichia coli* is _____
      a) Gram positive motile rods   b) Gram positive non-motile rods
      c) Gram negative non-motile rods d) Gram negative motile rods

   3) Amphotericin B and Clotrimazole can be used in treatment of _____
      a) Malaria   b) Vibrio   c) Candidiasis   d) Herpes simplex

   4) Presence of Negri bodies in the brain is sign of _____
      a) Rabies   b) Herpes   c) HIV   d) Hepatitis B

   5) Which of the following can cause urinary tract infection_____
      a) Treponema pallidum   b) Clostridium perfringens
      c) Mycoplasma pneumoniae   d) Proteus vulgaris

   6) _____ is NOT a viral disease.
      a) Hepatitis A   b) Rabies   c) Syphilis   d) HIV

   7) Swarming growth on agar is characteristic feature of _____
      a) Vibrio cholerae   b) Proteus vulgaris
      c) E. coli   d) Pseudomonas aerugenosa

8) Sulphonamides are inhibitor of _____ synthesis.

   a) Folic acid   b) Vitamin B12 c) Protein   d) Peptidoglycan

9) Incubation period of hepatitis B virus is _____

   a) 2-6 weeks   b) 6-10 days   c) 2-6 years   d) 2-6 months

10) Penicillin antibiotic acts on _____ synthesis.

   a) Cell wall   b) Nucleic acid

   c) Protein   d) Cell membrane

2. Answer **any five** of the following :   **10**

   1) List four antibiotics

   2) β-lactamase

   3) Leprosy

   4) Mode of action of Tetracycline

   5) Gram staining

   6) Give four examples of opportunities infections in HIV

   7) Significance of germ tube test.

3. A) Answer **any two of** the following :   **6**

     1) Spread of Rabies

     2) Cultural and biochemical characters of Klebsiella pneumoniae

     3) Organisms causing hospital infection.

  B) Write in brief on "Antibiotic sensitivity testing".   **4**

4. Answer **any two** of the following :   **10**

   1) Diagnosis of Helicobacter pylori infection.

   2) Explain with examples, mechanism of antibiotic resistance.

   3) Diagnosis of AIDS.

5. Answer **any two** of the following :   **10**

   1) Properties of ideal antibiotic

   2) Difference between Hepatitis A and B.

   3) Symptoms of Cholera.

_____

B.Sc. – III (Semester – VI) (Old) Examination, 2016
COMPUTER SCIENCE
Special Paper – XVI : Data Communications and Networking – II

Day and Date : Tuesday, 29-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　 2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative :   **10**

　1) _____ partition is used to hold kernel of LINUX.

　　a) Root　　　　　b) Boot　　　　　c) Swap　　　　　d) Home

　2) _____ is used in the delivery of voice communications and multimedia
　　 sessions on the internet.

　　a) GPRS　　　　b) VOIP　　　　c) GPS　　　　　d) GSM

　3) In _____ the claimant must identify himself to the verifier.

　　a) Message authentication　　　b) Message integrity

　　c) Entity authentication　　　　d) Message nonrepudiation

　4) The _____ is called a connectionless, unreliable transport protocol.

　　a) TCP　　　　　b) RARP　　　　c) ARP　　　　　d) UDP

　5) _____ role is used for authentication and installs active directory on the
　　 server.

　　a) Domain controller　　　　b) Web server

　　c) File server　　　　　　　d) Terminal server

　6) _____ is a web server of LINUX.

　　a) TUX　　　　　b) SQUID　　　　c) SAMBA　　　　d) DIG

　7) _____ is used to translate the protocols and communicate on two dissimilar
　　 networks.

　　a) Bridges　　　　b) Switches　　　　c) Routers　　　　d) Gateways

8) For securing network user authentication is handled at the _____ layer.

    a) Data link   b) Transport   c) Network   d) Application

9) Class _____ addresses were designed for multicasting.

    a) B   b) C   c) D   d) A

10) _____ operates at the physical as well as data link layers of the OSI protocol hierarchy.

    a) Bridges   b) Routers   c) Switches   d) Hubs

2. Answer the following **(any 5)** :   **10**

    1) Why terminal server role is added in windows server ?

    2) What is multiport bridge ?

    3) What is the use of postfix mail server of LINUX ?

    4) Which are the various control flags in TCP segment ?

    5) What is meant by encryption and decryption ?

    6) What is meant by well-known and ephemeral port number ?

3. A) Answer the following **(any 2)** :   **6**

    1) Which are the various types of VPN ?

    2) What is proxy ARP ?

    3) Which are the categories of cryptographic algorithm ?

  B) Explain useradd, usermod, userdel commands of LINUX server.   **4**

4. Answer the following **(any 2)** :   **10**

    1) Why dig server is used in LINUX ?

    2) Explain SNMP in detail.

    3) Explain repeaters in detail.

5. Answer the following **(any 2)** :   **10**

    1) Explain logon script in detail.

    2) Explain remote sensing in detail.

    3) Explain audio compression in detail.

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Seat No.

B.Sc. III (Semester – VI) Examination, 2016
ENGLISH (Compulsory) (New)
Breakthrough

Day and Date : Tuesday, 22-3-2016
Time : 10.30 a.m. to 12.30 p.m.

Max. Marks : 50

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative : **10**

   1) The action of the story whitewashing the fence takes place on _____ morning.
      a) Monday   b) Saturday   c) Sunday   d) Friday

   2) The work that had always been hateful in Tom's eyes was
      a) bringing oil from the shop
      b) whitewashing the feuce
      c) painting pictures
      d) bringing water from town pump

   3) The price of the necklace that mathilde lost was
      a) Forty Francs
      b) Thirty-six francs
      c) Five hundred francs
      d) Thirty-six thousand francs

   4) Pyramus and Thisbe belong to
      a) Babylonia   b) Somalia   c) Syria   d) Romania

   5) The poem 'In the Bazaars of Hydrabad' is
      a) a lyric   b) a sonnet   c) an elegy   d) an ode

   6) _____ is referred to as an auspicious queen in the poem 'On Virtue'.
      a) Virtue   b) Wisdom   c) Chastity   d) Glory

   7) The tag question for the sentence "Somebody left the book on the table" is
      a) did they ?   b) did he ?
      c) didn't he ?   d) didn't they ?

P.T.O.

8) The sentence "It was raining, yet we went shopping" is a
   a) simple sentence
   b) complex sentence
   c) compound sentence
   d) None of the above

9) "The man 'whom I met yesterday was a musician". The underlined clause is
   a) a noun clause
   b) a relative clause
   c) an adverbial clause
   d) a prepositional clause

10) The sentence "Does Kiran play the Sitar"? is
   a) a yes/no question
   b) a WH question
   c) a rhetorical question
   d) an imperative sentence

2. Answer **any five** of the following questions in short : **10**
   1) Why was Mathilde unhappy ?
   2) How did Loisel and Mathilde replace the necklace ?
   3) How did Tom persuade Jim to help with his task ?
   4) What was Tom's great magnificient inspiration ?
   5) Why did Pyramus and Thisbe kill themselves ?
   6) What message does Thomas Bulfinch convey through the story pyramus and thisbe ?

3. A) Answer **any two** of the following : **6**
   1) How is Wisdom described in On Virtue ?
   2) What are the merchants selling in the Bazaars of Hydrabad ?
   3) What kind of music is being played in the Bazaars of Hydrabad ?

   B) Answer **any two** of the following : **4**
   1) Write the important tips on time management.
   2) Imagine you have failed the V semester of compulsory English paper. How will you manage stress and overcome the failure ?
   3) Your sister has lost her laptop in her classroom. She is under depreciation. How will you help your sister to solve the problem ?

4. A) You travelled to Mumbai for attending an interview. During the journey by train you were introduced to a fellow passenger coming from Pune. Describe the person you met during this journey by throwing light on his personality traits. **10**

OR

B) Write a description of a national hockey-player you watched at an interview programme on T.V. conducted by the TV anchor, by describing his personal qualities, attitudes, speech etc.

5. Read the following passage and write one-third summary of it. **10**

Trees give shade for the benefits of others and while they themselves stand in the sun and endure scorching heat, they produce the fruit by which others profit. The character of good men is like that of trees. What is the use of this perishable body, if no use of it is made for the benefit of mankind ? Sandalwood – the more it is rubbed the more scent does it yield. Sugarcane – the more it is peeled and cut into pieces, the more juice does it produce. Gold – the more it is burnt, the more brightly does it shine. The men who are noble at heart do not lose these qualities even in losing their lives. What does it matter whether men praises them or not ? What difference does it make whether riches abide with them or not ? What does it signify whether they die at this moment or whether their lives prolonged ? Happen what may, those who tread in the right path will not set foot in any other. Life itself is unprofitable to a man who does not live for others. To live for the mere shake of living one's life is to live the life of dogs and cows. Those who lay down their lives for the shake of a friend or even for the sake of a stranger, will assuredly dwell forever in a world of bliss.

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SLR-W – 279

B.Sc. – III (Semester – VI) (New) Examination, 2016
PHYSICS (Special Paper – XIII)
Electrodynamics

Day and Date : Wednesday, 23-3-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions : i) **All** questions are **compulsory**.
ii) Figures to **right** indicate **full** marks.
iii) Draw **neat** diagram **whenever** necessary.
iv) **Use** of calculator or log table is **allowed**.

1. Select the correct alternative :   **10**

   i) The trajectory of charged particle in mutually perpendicular crossed electric and magnetic field is

   a) Cycloid   b) Parabola   c) Circular   d) Straight

   ii) Electric field intensity $\overline{E}$ in terms of scalar potential ϕ is given by

   a) $\overline{E} = \nabla\phi$ b) $\overline{E} = \nabla^2\phi$ c) $\overline{E} = -\nabla\phi$ d) $\overline{E} = -\nabla^2\phi$

   iii) Generation of motional emf is the principle of

   a) Battery   b) Generator

   c) Photovoltaic cell   d) Invertor

   iv) Self inductance per unit length of a long solenoid with 'n' turns per unit length and cross-sectional area A is

   a) $\mu_0 nA$ b) $\mu_0^2 nA$ c) $\mu_0 nA^2$ d) $\mu_0 n^2 A$

   v) The equation of continuity is in accordance with the law of conservation of

   a) Charge   b) Energy   c) Momentum   d) Current

   vi) Mathematical formulation of empirical laws in electricity and magnetism are known as

   a) Faraday's equations   b) Maxwell's equations

   c) Lorentz's equations   d) Ampere's equations

P.T.O.

vii) The plane electromagnetic waves are attenuated exponentially in

   a) Dielectrics   b) Semiconductors

   c) Conductors   d) Vacuum

viii) Electric ($\bar{E}$) and magnetic ($\bar{H}$) field vectors are mutually perpendicular to

   a) Polarization vector ($\bar{P}$)   b) Magnetization vector ($\bar{M}$)

   c) Displacement vector ($\bar{D}$)   d) Propagation vector ($\bar{K}$)

ix) When wave gets reflected from a surface of a denser medium, there occurs a phase change of

   a) 180°   b) 270°   c) 90°   d) 0°

x) Total power radiated by electric dipole is proportional to

   a) Square of frequency   b) Fourth power of frequency

   c) Square root of frequency   d) Frequency

2. Attempt **any five** of the following :   **10**

   i) Write the Gauss law in integral and differential forms.

   ii) Define the self inductance of a coil and give its unit.

   iii) State Biot and Savart law.

   iv) State Poynting theorem.

   v) Write the equations for transmission and reflection co-efficients.

   vi) Define the retarded time.

3. A) Attempt **any two** of the following :   **6**

   i) Explain mutual inductance and derive Newmann's formula.

   ii) For plane electromagnetic wave in vacuum, obtain relation between $\bar{E}$, $\bar{H}$ and $\bar{K}$ and compute the wave impedance of free space.

   iii) Write a note on total internal reflection.

  B) For sea water $\sigma = 4.2$ mho/m at a frequency of 50 kHz, calculate the skin depth.

  (Given : $\mu = 4\pi \times 10^{-7}$ H/m).   **4**

4. Attempt **any two** of the following : **10**

   i) Define emf and obtain a general expression for the motional emf. Explain the Faraday's law.

   ii) Obtain boundary conditions for electromagnetic vectors $\bar{D}$, $\bar{E}$, $\bar{B}$ and $\bar{H}$ at interface of two media.

   iii) Obtain an expression for total power radiated by an electric dipole.

5. Attempt **any one** of the following : **10**

   i) Show that a charged particle moves along a circular path with a constant speed in an uniform magnetic field ($\bar{B}$).

   ii) State Maxwell's equations in vacuum giving meaning of each term. Explain the physical significance of Maxwell's equations.

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Seat No.	

B.Sc. – III (Semester – VI) (New) Examination, 2016
CHEMISTRY (Special Paper – XIII)
Physical Chemistry

Day and Date : Wednesday, 23-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. :   i) **All** questions are **compulsory**.
        ii) **Draw** neat diagram **wherever** necessary.
       iii) Figures to the **right** indicate **full** marks.

1. Choose the most correct alternative for each of the following and rewrite the sentence :   **10**

   i) Triethylamine water system is an example of a _____ solution temperature.
      a) Minimum   b) Maximum
      c) Maximum-minimum   d) All of these

   ii) The liquid mixtures which distill with change in composition are called _____
      a) Azeotropic mixtures   b) Azeotropes
      c) Boiling mixtures   d) Zeotropic mixtures

  iii) Rotational spectra are observed in _____ infrared region.
      a) Near   b) Far   c) Middle   d) None of these

   iv) _____ is the fundamental equation in spectroscopy.
      a) $\gamma = \dfrac{C}{D}$ b) $I = \mu r^2$ c) $\Delta E = h\gamma$ d) $E = mc^2$

   v) The energy of oscillating molecule present in the lowest vibrational level is known as _____
      a) Vibrational point energy   b) First point energy
      c) Zero point energy   d) Oscillating energy

   vi) The term fugacity has dimensions _____
      a) Pressure   b) Volume   c) Temperature   d) Concentrations

  vii) For a thermodynamic spontaneous process at constant P and T, ΔG is _____
      a) Positive   b) Negative   c) Zero   d) None of these

viii) The equation $w_m = RT \ln K_p + \Delta nRT$ represents _____
a) Van't Hoff isotherm
b) Clapeyron equation
c) Van't Hoff isochore
d) Arrhenius equation

ix) Rate of reaction _____ with increase in temperature.
a) Decreases
b) Remain same
c) Increases
d) All of these

x) For third order reaction, half life period $\left(t_{1/2}\right) =$ _____

a) $\dfrac{1}{3a}$
b) $\dfrac{2}{3ak}$
c) $\dfrac{3}{2a^2k}$
d) $\dfrac{0.6931}{k}$

2. Answer **any five** of the following :   **10**
    i) What are ideal solution ?
    ii) How bond length (r_o) of diatomic molecule is calculated ?
    iii) What is fugacity ?
    iv) Describe variation of Gibb's function with pressure at constant temperature.
    v) What is temperature coefficient ?
    vi) What are simultaneous reactions ?

3. A) Answer **any two** of the following :   **6**
    i) What is Raoult's law ?
    ii) What are the applications of Clapeyron-Clausis equation ?
    iii) Describe in brief the parallel reactions.

   B) The bond length of NO molecule is 1.151×10^{-10} m. Calculate rotational constant of pure NO molecule, if its reduced mass is 1.24×10^{-26} kg.   **4**

4. Answer **any two** of the following :   **10**
    i) Describe in brief vibrational spectra of diatomic molecule.
    ii) Derive thermodynamically Van't Hoff reaction isochore.
    iii) What is temperature effect on rate of reaction ?

5. Answer **any two** of the following :   **10**
    i) Discuss miscible liquid pairs system with boiling point minimum.
    ii) Describe collision theory for the determination of energy of activation.
    iii) Calculate free energy change accompanying the reaction, $H_2 + Br_2 \rightleftharpoons 2\,HBr$ at 607 k, if equilibirum constant of the reaction is 40.5.

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Seat No.

B.Sc. (Part – III) (Semester – VI) (New) Examination, 2016
BOTANY (Special Paper – XIII)
Microbiology and Plant Pathology

Day and Date : Wednesday, 23-3-2016   Total Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : i) **All** questions are **compulsory**.
   ii) **All** questions carry **equal** marks.
   iii) **Draw** neat and labelled diagrams **wherever** necessary.
   iv) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences by choosing correct answer from the given
   alternatives :   **(1×10=10)**

   i) _____ are the prokaryotic organisms.
      a) BGA and Actinomycetes   b) MLBs
      c) Bacteria   d) All the above

   ii) PDA is _____ culture medium.
      a) Synthetic   b) Semi synthetic
      c) Natural   d) Both a) and b)

   iii) Cocci bacteria are _____ in shape.
      a) Rod shaped   b) Spherical
      c) Filamentous   d) Helical

   iv) Inoculation chamber can be sterilized by
      a) Applying alcohol   b) Using UV tube
      c) Sun drying   d) Both a) and b)

   v) Additional genome of a bacterial cell is known as
      a) Vector   b) Endospore
      c) Plasmid   d) All the above

   vi) Rust disease of Mango is caused by _____ pathogen.
      a) Algal   b) Fungal
      c) Bacterial   d) MLBs

P.T.O.

vii) *Pseudomonas solanacearum* causes _____ disease.

    a) Leaf curl of chilli   b) Bangadi disease of potato

    c) Grain smut of Jowar   d) GSD

viii) Vascular wilt disease spreads through

    a) Soil   b) Water   c) Air   d) Both a) and b)

ix) MLBs are without

    a) Cell wall   b) Cell organelles

    c) Ribosomes   d) Both a) and b)

x) _____ are fermented food products.

    a) Idli   b) Shoyu

    c) Dosa   d) All the above

2. Answer **any five** of the following :   **(2×5=10)**

   i) Define sterilization.

   ii) What are microbes ?

   iii) Give the symptoms of Anthracnose of Bean.

   iv) Define hypertrophy.

   v) What are soil borne diseases ?

   vi) State the names of microbes used in alcohol production.

3. A) Answer **any two** of the following :   **(2×3=6)**

    i) Describe the general characters of bacteria.

    ii) Give the symptoms of leaf curl of chilli.

    iii) Give the method of preparation of curd.

  B) Add a note on biopesticides.   **4**

4. Answer **any two** of the following :   **(2×5=10)**

   i) Describe the techniques of isolation of soil fungi by soil dilution method.

   ii) Write the symptoms, cause and control measures of downy mildew of bajra.

   iii) Classify plant diseases based on the symptoms.

5. Answer **any two** of the following :   **(2×5=10)**

   i) Describe the chemical methods of sterilization.

   ii) Describe the method of preparation of liquid culture medium.

   iii) Explain the production of alcohol by fermentation method.

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Seat
No.

B.Sc. (Part – III) (Semester– VI) Examination, 2016
ZOOLOGY (Special Paper – XIII) (New)
Physiology

Day and Date : Wednesday, 23-3-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate marks.
3) Draw **neat** labelled diagrams **wherever** necessary.

1. Multiple choice questions :   **10**

    1) Water soluble vitamin is

        a) Vit. B   b) Vit. A   c) Vit. K   d) Vit. D

    2) The emulsification fat is carried by _____ juice.

        a) Intestinal   b) Gastric   c) Bile   d) Pancreatic

    3) Blood pressure in healthy person is _____ mm Hg.

        a) 80/120   b) 120/80

        c) 140/160   d) 90/60

    4) Auricular systole and diastole lasts for about

        a) 0.2 sec   b) 0.4 sec   c) 0.3 sec   d) 0.1 sec

    5) Rickets caused due to deficiency of _____ Vitamin.

        a) Vit. D   b) Vit. K

        c) Vit. C   d) Vit. E

    6) Hamberger phenomenon is called as _____ shift.

        a) Nitrate   b) Phosphate   c) Chloride   d) Bicarbonate

    7) _____ is the waste product produced in Ornithine cycle.

        a) Urea   b) Ammonia

        c) Creatinine   d) Creatine

8) HCl is secreted by
   a) Chief cells
   b) Neck cells
   c) Oxyntic cells
   d) Argentaffin cells

9) _____ is called antisterility Vitamin.
   a) Vit. D
   b) Vit. K
   c) Vit. E
   d) Vit. A

10) Bowmans capsules are located in _____ region of kidney.
   a) Cortex
   b) Medulla
   c) Pelvic
   d) Calyx

2. Answer **any five** of the following :   **10**
   1) Definition of digestion.
   2) Draw neat labelled diagram of nerve cell.
   3) Physiological role of Vit. C.
   4) Composition of gastric juice.
   5) Protein as a nutritional requirement.
   6) Physiological response of Yoga on respiration.

3. A) Answer **any two** of the following :   **6**
   1) ECG.
   2) Vitamin E.
   3) Structure of striated muscle.

   B) Ultrafiltration in Kidney.   **4**

4. Answer **any two** of the following :   **10**
   1) Cardiac cycle.
   2) Vitamin D – sources and importance.
   3) Structure of malpighian body.

5. Answer **any one** of the following :   **10**
   1) Describe Krebs cycle in detail.
   2) Describe physiology of urine formation.

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Seat No.

B.Sc. – III (Semester – VI) (New) Examination, 2016
MATHEMATICS (Special Paper – XIII)
Metric Spaces

Day and Date : Wednesday, 23-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N. B. :   i) **All** questions are **compulsory**.
        ii) Figures to the **right** indicate **full** marks.

1. Choose correct alternative :   **10**

    1) If l^2 are the set of all sequences $x = (x_n)$ and $y = (y_n)$ we define

$$d(x, y) = \left[\sum_{n=1}^{\infty} (x_n - y_n)^2 \right]^{\frac{1}{2}} \text{ by triangle in equality}$$

     a) $\left[\sum_{k=1}^{\infty} (x_k - y_k)^2 \right]^{\frac{1}{2}} \leq \left[\sum_{k=1}^{\infty} (x_k - z_k)^2 \right]^{\frac{1}{2}} + \left[\sum_{k=1}^{\infty} (z_k - y_k)^2 \right]^{\frac{1}{2}}$

     b) $\left[\sum_{k=1}^{\infty} (x_k - y_k)^2 \right]^{\frac{1}{2}} \leq \left[\sum_{k=1}^{\infty} (x_k - y_k)^2 \right]^{\frac{1}{2}} + \left[\sum_{k=1}^{\infty} (y_k - z_k)^2 \right]^{\frac{1}{2}}$

     c) $\left[\sum_{k=1}^{\infty} (x_k - y_k)^2 \right]^{\frac{1}{2}} \leq \left[\sum_{k=1}^{\infty} (x_k - y_k)^2 \right]^{\frac{1}{2}} + \left[\sum_{k=1}^{\infty} (x_k - z_k)^2 \right]^{\frac{1}{2}}$

     d) None of these

    2) The subset of $\left\{ 1, \dfrac{1}{2}, \dfrac{1}{3}, ... \right\}$ of the real line has _____ as a limit point.

     a) 1   b) 0   c) ∞ d) $\dfrac{1}{2}$

    3) The set Q of all rational number is _____ in R.
     a) Closed   b) Open   c) Not closed   d) None of these

4) Let X be the set of real line R and let $F_n = \left(0, \dfrac{1}{n}\right]$ then $\lim\limits_{n \to \infty} d\,(F_n) =$ _____

   a) 0   b) $\dfrac{1}{n}$ c) 1   d) $\dfrac{1}{2}$

5) Let $f : (0, 1] \to R$ be defined as $f\,(x) = \dfrac{1}{x}$, the f is continuous on _____

   a) [0, 1]   b) [0, 1)   c) (0, 1]   d) (0, 1)

6) Let $f : R \to R$ and $a \in R$. If f is continuous at x = a then
   a) W [f ; a] < 0   b) W [f : a] = 0
   c) W (F ; a) > 0   d) W [f ; a] = a

7) Every compact metric space is
   a) Complete and totally bounded   b) Complete and not bounded
   c) Bounded and not complete   d) Complete and not totally bounded

8) Let A = [0, 1) and B = (1, 2] and R be a metric space with discrete metric 'd' then d (A, B) = _____

   a) 0   b) 1   c) 2   d) $\dfrac{1}{2}$

9) Closed subset of compact metric space is _____
   a) Closed   b) Open   c) Compact   d) Complete

10) The mapping $\rho : R \times R \to R$ be defined by $\rho\,(x, y) = |x - y|$; $x, y \in R$ then ρ is called
   a) Absolute value metric   b) Discrete metric
   c) Pseudo metric   d) None of these

2. Attempt **any five** of the following :   **10**

   1) Prove that a convergent sequence has a unique limit.

   2) Let A be subset of l^2 space consisting of the points $e_1 = (1, 0, 0, ...)$, $e_2 = (0, 1, 0, 0, ...)$, $e_3 = (0, 0, 1, ...)$ _____, then A is bounded but it is not totally bounded sets.

   3) Let E be a closed and bounded, then a set E in R with absolute value metric is compact.

4) Prove that the inerval [a, b) is neither open nor closed.

5) Define totally bounded sets.

6) If A is a closed subset of a compact metric space (X, d), then the metric space (A, d) is compact.

3. A) Attempt **any two** of the following : **6**

1) If F_1 and F_2 are closed subset of metric space M, then prove that $F_1 \cup F_2$ is closed.

2) The open interval E = (0, 1) on the real line with absolute value metric is not compact.

3) Let (M, ρ) be metric space and let a be point in M. If $\lim_{x \to a} f(x) = L$ and $\lim_{x \to a} g(x) = N$ then $\lim_{x \to a} (f(x) \cdot g(x)) = L \cdot N$.

B) If E is any subset of metric space M then $\overline{E}$ is closed. **4**

4. Attempt **any two** of the following : **10**

1) If A is totally bounded subset of (X, d) then $\overline{A}$ is totally bounded.

2) The real valued function f is continuous at $a \in R'$ iff given $\varepsilon > 0 \, \exists \, \delta > 0$ such that $|f(x) - f(a)| < \varepsilon \, \forall \, |x - a| < \delta$.

3) Let l^2 be the set of all sequences x = (x_n) of real number such that $\sum_{n=1}^{\infty} |x_n|^2 < \infty$. If x = (x_n) and y = (y_n) are in l^2, we shall define 'd' for l^2 as

$$d(x, y) = \left(\sum_{n=1}^{\infty} (x_n - y_n)^2 \right)^{\frac{1}{2}}$$ prove that (l^2, d) is metric space.

5. Attempt **any one** of the following : **10**

1) Let (M, ρ) be complete metric space, if T is contraction on M, then there is one and only one point x in M such that $T_x = x$.

2) If f is continuous at $a \in R'$ iff $\{x_n\}_{n=1}^{\infty}$ be any sequence of real number converges to a, we shall must show that $\lim_{n \to \infty} f(x_n) = f(a)$.

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SLR-W – 284

Seat No.	

B.Sc. III (Semester – VI) (New) Examination, 2016
STATISTICS (Special Paper – XIII)
Statistical Inference – II

Day and Date : Wednesday, 23-3-2016 Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

***Instructions* : 1) *All* questions are *compulsory* and carry *equal* marks.**
2) Figures to the *right* indicate *full* marks.

1. Choose the correct alternative : **10**

   i) For a large sample, 95% confidence limits for θ of $f(x, \theta) = \theta e^{-ax}$, $x \geq 0$ are

   a) $\left(1 \pm \dfrac{1.96}{\sqrt{n}}\right)\overline{X}$
   b) $\left(1 \pm \dfrac{1.96\,\overline{X}}{\sqrt{n}}\right)/n$

   c) $\left(1 \pm \dfrac{1.96}{\sqrt{n}}\right).\dfrac{1}{\overline{X}}$
   d) None of these

   ii) Which of the following is correct if $P(5.25 \leq \theta \leq 20.25) = 0.95$

   a) 5.25 and 20.25 are 95% confidence limits
   b) The length of the confidence interval is 20
   c) Both a) and b)
   d) None of these

   iii) For finding the confidence interval of the ratio of variances of two normal populations, the distribution used is

   a) χ^2 b) F c) t d) None of these

   iv) A test T which is atleast as powerful as any other test of the same size is known as

   a) M.P. test b) U.M.P. test c) L.R. test d) None of these

   v) Test of $H_0 : \mu = 70$ against $H_1 : \mu > 70$ leads to

   a) left tailed test b) right tailed test
   c) two tailed test d) none of these

   P.T.O.

vi) Neyman Pearson lemma provides

    a) Unbiased C.R.

    b) Admissible C.R.

    c) Minimal C.R.

    d) Most powerful C.R.

vii) A sequence of symbols shows lack of randomness if there are

    a) Too many runs   b) Too few runs

    c) Both a) and b)   d) Neither a) or b)

viii) Which of the following is applicable to paired data ?

    a) The sign test

    b) The median test

    c) Wilcoxon's signed rank test

    d) Both a) and c)

ix) The ratio of likelihood function under H_0 and the entire parametric space is called

    a) Probability ratio

    b) Sequential probability test

    c) Likelihood ratio

    d) None of these

x) In Sequential Probability Ratio Test (SPRT) the sample is

    a) fixed   b) a random variable

    c) fixed but small   d) fixed but large

2. Explain the following terms **any five** :   **10**

    i) Simple and composite hypothesis.

    ii) Null and alternative hypothesis.

    iii) Size of a test.

    iv) Most powerful test.

    v) Pivotal quantity.

    vi) One sided confidence interval.

3. A) Answer **any two** of the following : **6**

   i) A single observation is taken from the distribution having p.d.f. $f(x, \theta) = \dfrac{1}{\theta}$;

   $0 < x < \theta$ to test the hypothesis $H_0 : \theta = 1$ against $H_1 : \theta = 2$. The hypothesis H_0 is rejected if the observed value is greater than or equal to 0.8. Find the probability to Type I and Type II error.

   ii) If $x_1, x_2, ..., x_n$ is a random sample from a distribution having p.d.f. $f(x, \theta) = \theta.x^{\theta-1}$; $0 < x < 1$. Show that a B.C.R. for testing $H_0 : \theta = 1$ against $H_1 : \theta = 2$ is $\prod\limits_{i=1}^{n} X_i \geq C$.

   iii) Obtain $100(1 - \alpha)\%$ confidence interval for the parameter μ in case of $N(\mu, \sigma^2)$ distribution when σ^2 is known.

   B) Explain Wilcoxon's signed rank test for paired observations. **4**

4. Answer **any two** of the following : **10**

   i) Obtain the SPRT for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 (> \theta_0)$ in sampling from $f(x, \theta) = \theta e^{-\theta x}$; $x \geq 0, \theta > 0$.

   ii) Explain run test for two samples.

   iii) Describe the procedure of median test.

5. Answer **any one** of the following : **10**

   i) Derive the likelihood ratio test for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu \neq \mu_0$ when a sample of size n is taken from $N(\mu, \sigma^2)$.

   ii) State and prove Neyman-Pearson lemma.

   ———————————————

Seat No.

B.Sc. – (Part – III) (Semester – VI) Examination, 2016
GEOLOGY (Special Paper – XIII) (New)
Principles of Stratigraphy and Crystallography & Earth's History

Day and Date : Wednesday, 23-3-2016　　　　　　　　Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Figures to the **right** indicate **full** marks.
　　　　　　　　3) Draw **neat** diagrams **wherever** necessary.

1. Fill in the blanks with correct answer from the given options :　　　**10**

　　1) There are _____ elements of symmetry to describe any crystal.

　　　　a) 2　　　　　　b) 3　　　　　　c) 4　　　　　　d) 1

　　2) Flat surface of a crystal is called as _____

　　　　a) face　　　　b) edge　　　　c) solid angle　　　d) corner

　　3) Two faces of a crystal meets to form an _____

　　　　a) corner　　　b) solid angle　　c) center　　　　d) edge

　　4) Cube is _____ form.

　　　　a) open　　　　b) closed　　　　c) combination　　d) twin

　　5) Basal pinacoid have _____ faces.

　　　　a) 4　　　　　　b) 2　　　　　　c) 6　　　　　　d) 3

　　6) The study of space and time of layered rocks is called _____

　　　　a) petrology　　b) geology　　　c) stratigraphy　　d) mineralogy

　　7) There are main _____ principles of stratigraphy.

　　　　a) 3　　　　　　b) 2　　　　　　c) 4　　　　　　d) 10

　　8) James Hutton presented the _____ principle of stratigraphy.

　　　　a) order of super position　　　　b) uniformitarianism

　　　　c) faunal succession　　　　　　d) time

9) William Smith suggested the principle of _____

   a) order of super position   b) uniformitarianism

   c) faunal succession   d) time

10) In an order of superposition principle _____ beds are at top.

   a) youngest   b) oldest   c) younger   d) older

2. Answer **any five** of the following :   **10**

  1) Define crystal.

  2) Define form of a crystal.

  3) What is element of symmetry ? Describe elements of symmetry.

  4) Describe planes of symmetry of a cube.

  5) What is stratigraphy ?

  6) What is Geological Time Scale ?

3. A) Answer **any two** of the following :   **6**

  1) Describe axes of symmetry of a Cube.

  2) Describe elements of symmetry of Monoclinic system crystal. Describe Clino-pinacoid.

  3) Describe basal pinacoids of Hexagonal and Tetragonal system.

  B) Write answer of **any one** of the following :   **4**

  1) Describe principle of order of superposition.

  2) Draw and describe Dodecahedron.

4. Answer **any two** of the following :   **10**

  1) Describe principle of Uniformitarianism.

  2) Sketch and describe Cube and Octahedron combination form.

  3) Sketch and describe Tetragonal Prism of 1st and 2nd orders.

5. Answer **any two** of the following :   **10**

  1) Describe principle of Faunal Succession.

  2) Draw the diagrams and describe Trapezohedron and Tris-octa hedron.

  3) Draw the diagrams and describe Macropinacoid and Brachy Pinacoid.

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Seat No.

B.Sc. – III (Semester – VI) (New) Examination, 2016
MICROBIOLOGY
Microbial Genetics (Special Paper – XIII)

Day and Date : Wednesday, 23-3-2016　　　　　　　　Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Figures to **right** indicate **full** marks.

1. Rewrite the sentences after choosing correct answer from the given alternatives : **10**

　　1) The conversion of a gene's nucleotide sequence into a protein is called
　　　as _____

　　　A) Replication　　　　　　　　B) Gene expression

　　　C) Transcription　　　　　　　D) Translation

　　2) Helix unwinding during replication is accomplished by _____

　　　A) DNA helicases　　　　　　　B) DNA gyrase

　　　C) DNA polymerase I　　　　　　D) DNA polymerase II

　　3) The exact point where nucleotides are being added to growing daughter
　　　strands during DNA replication are called _____

　　　A) The origin　　　　　　　　　B) The double helix

　　　C) The template　　　　　　　　D) The replication fork

　　4) _____ is the best description of a gene.

　　　A) A molecule of DNA

　　　B) A nucleotide

　　　C) A sequence of DNA nucleotides that codes for a single protein

　　　D) A molecule of RNA

P.T.O.

5) _____ is the function of transfer RNA (tRNA).

   A) It "transfers" the information encoded in a gene to a ribosome

   B) It forms part of a ribosome's structure

   C) It permits mRNA to detach from the ribosome when protein synthesis is complete

   D) It carries amino acids into a growing protein chain, as specified by codons in the mRNA

6) The plasmid vectors which are designed to replicate in two different hosts are called as _____

   A) Shuttle vactors   B) Plasmids

   C) Cosmid   D) Replacement vactors

7) Different forms of the same gene are called as _____

   A) Alleles   B) Gametes

   C) Genotypes   D) Recombined genes

8) Mutations arising from insertion or deletion of nucleotides are called _____

   A) Suppressor mutations   B) Base pair substitutions

   C) Frame shift mutations   D) Spontaneous mutations

9) The initial source for all genetic variation is _____

   A) Sexual reproduction   B) Mutation

   C) Conjugation   D) Transformation

10) The flow of genetic message in microbial cells usually takes place from _____

   A) DNA through RNA to proteins

   B) Proteins through RNA to DNA

   C) RNA through DNA to proteins

   D) None of these

2. Answer **any five** of the following :   **10**

   i) Write down the corresponding sequence (DNA) of a gene **for** following mRNA sequence

   UUUCAGACUG

   ii) Define DNA sequencing.

   iii) What is Phagemid ?

iv) What is operon ?

v) Define R DNA technology.

vi) Define genotype.

vii) What is palindrome sequence ?

3. A) Answer **any two** of the following : **6**

    a) Give brief account of DNA Finger printing.

    b) Draw a diagram showing structure of Lac- Operon.

    c) Mutation in bacteriophages.

  B) Describe briefly Folded fiber model of *E coli* chromosome. **4**

4. Answer **any two** of the following : **10**

  i) Give the detailed account of time course of phenotypic expression of mutation.

  ii) Briefly explain concept and applications of protein engineering.

  iii) Describe briefly selection and detection of mutants.

5. Attempt **any two** of the following : **10**

  i) Discuss briefly the "Cis Trans test".

  ii) Describe briefly the process of replication.

  iii) Give the detail account of Maxam and Gilbert's method of sequencing.

_____

SLR-W – 287

1. Select the correct alternative for the following.   **10**

   i) Parallel connections of SCR's is used to improve _____ rating.

      a) Current   b) Voltage

      c) Both (a) and (b)   d) None of these

   ii) Power MOSFET is a

      a) Current controlled device   b) Voltage controlled device

      c) Field controlled device   d) Both (b) and (c)

   iii) _____ is programmable in PUT.

      a) Gate current   b) Load current

      c) Anode voltage   d) None of these

   iv) _____ is important component in the SCR commutation circuit.

      a) Resistor   b) Inductor

      c) Capacitor   d) All of these

   v) A free wheeling diode is used in controlled rectifier in case of

      a) inductive load   b) resistive load

      c) capacitive load   d) none of these

vi) The duty cycle of chopper is

a) $T_{on} + T_{off}$ b) $\dfrac{T_{off}}{T_{on}}$ c) $\dfrac{T_{on}}{T_{on} + T_{off}}$ d) $\dfrac{T_{on} + T_{off}}{T_{off}}$

vii) SMPS means

   a) Single Mode Power Supply   b) Switched Mode Power Supply

   c) Series Mode Power Supply   d) Shunt Mode Power Supply

viii) Reverse recovery current depends on

   a) Storage charge   b) Temperature

   c) Peak inverse voltage   d) Forward current

ix) The minimum value of current required to maintain conduction in thyristor is called

   a) breakover current   b) holding current

   c) gate trigger current   d) latching current

x) _____ is used for DC power to AC power conversion.

   a) Inverter   b) Chopper   c) Rectifier   d) Amplifier

2. Answer **any five** of the following.   **10**

   i) Explain the need of heat sink.

   ii) Sketch equivalent circuit of IGBT.

   iii) What is chopper ?

   iv) Explain the principle of phase control.

   v) Compare natural and forced commutation.

   vi) State the applications of inverter.

3. A) Answer **any two** of the following.   **6**

   i) Explain class A commutation method for SCR.

   ii) Explain working of series inverter.

   iii) Explain principle of DC Motor.

   B) Write a short note on UPS.   **4**

4. Answer **any two** of the following. **10**

   i) Explain switching characteristics of power BJT.

   ii) Explain SCR turn on circuit using UJT.

   iii) Explain basic chopper circuit.

5. Answer **any one** of the following. **10**

   i) Describe single phase half wave controlled rectifier with resistive load.

   ii) Give classification of inverters. Explain principle and working of parallel inverter.

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SLR-W – 288

Seat
No.

B.Sc. (Part – III) (Semester – VI) (New) Examination, 2016
COMPUTER SCIENCE
(Special Paper – XIII) Web Technology

Day and Date : Wednesday, 23-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory.**

       2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative :   **10**

   1) _____ of the following is not Authentication mode used in ASP.NET.
     a) Passport   b) Windows   c) Server   d) Forms

   2) _____ is client side state management technique.
     a) Application   b) QueryString   c) ClientState   d) Session

   3) _____ is first event triggers by an ASP.Net page.
     a) Load   b) Render   c) Init   d) Click

   4) To cancel editing in gridview; _____ property is used.
     a) EditIndex = – 1   b) EditIndex = 0
     c) CancelEditing = 1   d) CancelEditing = – 1

   5) _____ directives's duration attribute specifies how long the page is cached.
     a) @Catch   b) @OutputCatch   c) @Page   d) @Register

   6) _____ property of multiview control is used to display specific view.
     a) ViewIndex   b) DisplayView
     c) ActiveViewIndex   d) DisplayViewIndex

   7) For specifying pattern in RegularExpressionValidation control,_____ property is issued.
     a) ValidationExpression   b) Pattern
     c) RegularExpression   d) PatternExpression

P.T.O.

8) _____ layout of the list control display list items like a word processing document.
   a) Table   b) Word   c) Column   d) Flow

9) _____ method of data adapter is used to load data into dataset.
   a) Load   b) Fill   c) Get   d) DataFill

10) Authorization technique uses Role Provider.
   a) True   b) False

2. Answer the following **(any 5)**:   **10**
   1) What is self-page and cross page posting ?
   2) What is Namespace ? Explain which namespace is used for file related and drawing related program.
   3) Explain Hidden field state management technique.
   4) Explain TextBox Control.
   5) What is Authentication and Authorization ?
   6) Explain connection string object.

3. A) Answer the following **(any 2)** :   **6**
   1) Explain Web page life cycle in detail.
   2) Explain custom validation control with example.
   3) Differentiate ASP and ASP.Net.

   B) Explain need of master pages and design simple master page.   **4**

4. Answer the following **(any 2)** :   **10**
   1) What is Server side state management ? Explain session state management in detail.
   2) Design web page which insert, delete and update records in database.
   3) Explain different page directive's used in ASP.Net.

5. Answer the following **(any 2)** :   **10**
   1) What is membership provider ? Explain in detail.
   2) Design web page which display 10 friends birthday in calender control.
   3) What is Themes and Skins ? Explain in detail.

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Seat
No.

B.Sc. – III (Semester – VI) (New) Examination, 2016
PHYSICS (Special Paper – XIV)
Material Science

Day and Date : Saturday, 26-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) **Use** of log table or calculator is **allowed**.
4) Neat diagrams must be drawn **whenever** necessary.

1. Select the correct alternative.   **10**

   i) Applied force per unit cross-sectional area of a body is called
      a) stress   b) strain   c) hardness   d) creep

   ii) Electrical conductivity is the reciprocal of
      a) voltage   b) current   c) resistivity   d) capacity

   iii) Polymers are long chain organic macromolecules having _____ as a
        common element in their structure.
      a) hydrogen   b) nitrogen   c) sodium   d) carbon

   iv) _____ polymer is prepared by condensation polymerization.
      a) Teflon   b) Rubber   c) Styrene   d) Nylon

   v) Ceramics normally exhibits _____ nature.
      a) ductile   b) brittle   c) soft   d) elastic

   vi) Thermal conductivity of ceramics is
      a) infinite   b) greater than metals
      c) less than metals   d) same as metal

   vii) The strength of composite is
      a) low   b) high   c) zero   d) negative

   viii) The combination of two or more materials is called
      a) composites   b) non-linear   c) nano   d) magnetic

P.T.O.

ix) When grain size reduces to nano scale, then the material becomes

   a) stronger and harder   b) soften and ductile

   c) low strength   d) elastic and plastic

x) The materials which find application in the field of medicine are called

   a) nano materials   b) biomaterials

   c) non linear materials   d) magnetic

2. Answer **any five** of the following.   **10**

   i) Define specific heat and state its unit.

   ii) What is degree of polymerization ?

   iii) Give any four examples of ceramics.

   iv) Give any four characteristics of composites.

   v) Explain any one type of synthesis of nanostructured material.

   vi) What is biomechanism ?

3. A) Answer **any two** of the following.   **6**

     i) Explain fibre-reinforced composite.

     ii) Explain properties of nanostructured materials.

     iii) Write note on processing of biomaterials.

  B) Explain polymerization mechanism.   **4**

4. Answer **any two** of the following.   **10**

   i) What is ceramics ? Explain Rock Salt (NaCl) structure with suitable diagram.

   ii) Explain formation of thin film by chemical bath deposition method.

   iii) Explain applications of biomaterials.

5. Attempt **any one** of the following.   **10**

   i) Explain classification of materials in detail. Explain electrical properties of materials.

   ii) Explain fabrication processes of polymers and give important properties of polymers.

SLR-W – 290

Seat
No.

B.Sc. III (Semester – VI) (New) Examination, 2016
CHEMISTRY
Inorganic Chemistry (Special Paper – XIV)

Day and Date : Saturday, 26-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
               2) Draw **neat** diagram and give equation **wherever** necessary.
               3) Figures to the **right** indicate **full** marks.

1. Select the correct alternative for the following and rewrite sentence :   **10**

    1) Name of the element with atomic number 113 is
       a) Un-un-trium   b) Di-un-trium
       c) Untrium   d) Trium-un-un

    2) Idea of superconductor was introduced by
       a) Kamerlingh Onnes   b) Bloch
       c) Pauling   d) Drude

    3) In XeF_2 molecule Xe shows _____ hybridization.
       a) Sp   b) Sp^2 c) Sp^3 d) Sp^3d

    4) Nickel carbonyl has _____ structure.
       a) Octahedral   b) Tetrahedral
       c) Square planar   d) Trigonal bipyramidal

    5) Atmospheric corrosion involves _____ heterogeneous system.
       a) Solid – solid   b) Solid – gas
       c) Liquid – gas   d) Liquid – solid

    6) Borazine undergoes _____ reaction.
       a) Substitution   b) Addition   c) Reduction   d) Oxidation

    7) Most of actions shows _____ oxidation states.
       a) + III   b) + IV   c) + VI   d) + II

    8) The terminal B – H bondlength is _____ in diborane.
       a) 120 pm   b) 123 pm   c) 118 pm   d) 119 pm   **P.T.O.**

9) As the temperature increases the conductivity of semiconductors
   a) Increases
   b) Decreases
   c) Remain same
   d) First increases and then decreases

10) _____ is the best general method of preparation of TU elements.
   a) Heavy-ion bombardment
   b) Accelerated projectile
   c) Neutron capture B-decay
   d) None of these

2. Answer **any five** of the following :   **10**
   1) Draw a neat labelled diagram showing the mechanism of electrochemical corrosion.
   2) Describe the synthesis of alkyl-alluminium compounds.
   3) Mention methods of separation of lanthanides.
   4) Define Immersed corrosion.
   5) How will you synthesize borazine from diborane ?
   6) What are the application of superconductors ?

3. A) Answer **any two** of the following :   **6**
   1) Discuss the structural study of alkyl-lithium compounds.
   2) Explain intrinsic semiconductors.
   3) Discuss the structure of SO_2 molecule.

   B) Write a note on oxide film-theory of passivity.   **4**

4. Write notes on **any two** of the following :   **10**
   1) Give the detailed electronic configuration of lanthanides.
   2) Describe the structure of diborane.
   3) What is super-conductor ? Describe the structure of 1-2-3 superconductor.

5. Answer **any two** of the following :   **10**
   1) Explain IUPAC nomenclature of super heavy elements with atomic number greater than 100.
   2) What is metallic bond ? Discuss free electron theory of bonding in metal.
   3) Describe the structure of XeO_4.

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Seat
No.

B.Sc. – III (Semester – VI) Examination, 2016
BOTANY (Special Paper – XIV) (New)
Systematics of Angiosperms

Day and Date : Saturday, 26-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

1. Rewrite the following sentences by choosing correct answer from the given
   alternatives :   **10**

   1) Engler and Prantl's system of classification is _____ type of classification.
      a) Artificial   b) Natural   c) Phylogenetic   d) None of these

   2) Bennettitalean theory was proposed by
      a) Saporta and Marion   b) Wettstein
      c) Markgraf   d) P. Maheshwari

   3) _____ flowers is treated as primitive.
      a) Unisexual   b) Bisexual   c) Sterile   d) Nuter

   4) According to Engler and Prantl's system class-Dicotyledonae have _____
      subclass.
      a) 4   b) 3   c) 2   d) 1

   5) The elongation of internode between petals and stamens is called
      a) Anthophore   b) Androphore   c) Gynophore   d) Carpophore

   6) The most common embryo sac in angiosperm is _____ Nucleated.
      a) 5   b) 6   c) 7   d) 8

   7) *Polygonum* type of embryo sac is
      a) Monosporic   b) Bisporic   c) Tetrasporic   d) None of these

   8) Campanulate corolla is characteristic of family
      a) Myrtaceae   b) Rutaceae   c) Bigononaceae   d) Rubiaceae

   9) _____ is an example of family myrataceae.
      a) *Citrus medica*   b) *Nigela sativa*
      c) *Psidium guajava*   d) *Coffea arebica*

   10) Parachute mechanism of seed dispersal is seen in
      a) *Callotropis*   b) *Climatis*   c) *Moringa*   d) *Terminalia*

P.T.O.

2. Answer **any five** of the following :   **10**

   1) Give any four advanced characters of flower.

   2) Define palynology.

   3) What is embryo sac ?

   4) Sketch and label Anatropous ovule.

   5) What is Dichogamy ?

   6) Give distinguishing characters of family – Rubiaceae.

3. A) Write short notes on **any two** of the following :   **6**

   i) Describe Gnetalean theory of Angiosperms.

   ii) Write on role of anatomy in relation to taxonomy.

   iii) Describe cellular endosperm.

   B) Describe monosporic (*Polygnum* type) embryo sac.   **4**

4. Answer **any two** of the following :   **10**

   i) Give outline of Engler and Prantl's system of classification.

   ii) Write note on dispersal of fruit and seeds.

   iii) Give the distinguishing characters of any one of the following families with economic importance.

   Family-Cannaceae, Cucurbitaceae.

5. Answer **any two** of the following :   **10**

   i) Explain Double fertilization is a triple fusion.

   ii) Describe Bisporic (Allium type) embryo sac.

   iii) Describe Adaptation for anemophily and hydrophily.

   _____

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B.Sc. – III (Semester – VI) (New) Examination, 2016
ZOOLOGY (Special Paper – XIV)
Endocrinology, Environmental Biology and Toxicology

Day and Date : Saturday, 26-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : i) **All** questions are **compulsory**.

ii) Figures to the **right** indicate **full** marks.

iii) Draw **neat** labelled diagrams **wherever** necessary.

1. Select the appropriate answer from each of the following and rewrite the sentence.   **10**

1) Excess intake of substance than organisms ability to remove it from the body is known as
   a) Bioremidiation   b) Bio accumulation
   c) Biodynamix   d) Bio magnification

2) Long term exposure to a toxic chemical produces an effect called as _____
   a) acute   b) highly acute
   c) sub-chronic   d) chronic

3) Conservation of plants and animals in their native ecosystem is known as _____conservation.
   a) In-situ   b) Ex-situ   c) In-vivo   d) Ex-vivo

4) Photic zone of marine water habitat is usually extended upto _____
   a) 200   b) 500   c) 10   d) 50

5) Mytilus an intertidal rocky shore marine molluscan fauna has _____ adoption to its habitat.
   a) plough like foot   b) byssal thread
   c) chitin plate   d) hooked oral arms

6) Number of sweat glands in skin of _____ mammals much reduced to avoid water evaporation through surface.

 a) desert b) aquatic c) wetland d) glaciers

7) _____ is both exocrine and endocrin in nature.

 a) Pituitary b) Thyroid c) Pancreas d) Parathyroid

8) Calcitonin, a thyroid hormone helps to _____

 a) Elevate the Ca^+ level in blood
 b) Lowers Ca^+ level in blood
 c) Elevate potassium (k^+) level in blood
 d) Lowers potassium (k^+) level in blood

9) Zona glomeruloza or glomerular area of adrenal cortex is involved in _____

 a) water and electrolyte balance b) melanocyte enhancement
 c) steroid inhibition d) blood pressure

10) Parathormone induces _____

 a) increase blood sugar level
 b) decrease serum Ca^+ level
 c) increase serum Ca^+ level
 d) decrease blood sugar level

2. Answer **any five** of the following : **10**

 I) Beta cell

 II) CRH

 III) Endangered species

 IV) LD-50

 V) Virtual dissection

 VI) Prostaglandin

3. A) Answer **any two** of the following : **6**

 I) Biological indicator of pollution-brief idea.

 II) Hormones of Islets of Langerhans

 III) Disorders of thyroid hormone.

 B) Solid waste management. **4**

4. Answer **any two** of the following : **10**

   I) Hormones nature and regulation of parathyroid gland.

   II) Faunal adaptation in grassland habitat animals.

   III) Bioaccumulation.

5. Answer **any one** of the following : **10**

   I) Write on histology of adrenal gland with its hormonal secretions.

   II) Describe the characteristics and faunal adaptation of marine habitat.

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Seat
No.

B.Sc. III (Semester – VI) Examination, 2016
MATHEMATICS (Special Paper – XIV) (New)
Numerical Analysis

Day and Date : Saturday, 26-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) **Use** of scientific calculators are **allowed**.
   2) **All** questions are **compulsory**.
   3) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative :   **10**

   1) If $y(x) = x(x-1)(x-2)$ then $\Delta y(x) =$

      a) $3x(x-1)$ b) $3x(x+1)$ c) $2x(x-1)$ d) $2x(x+1)$

   2) The $(n+1)^{th}$ order difference of nth degree polynomial is

      a) one   b) zero   c) two   d) none of these

   3) The value of $E^{-1}\nabla = $ _____

      a) $\nabla - \nabla^2$ b) $\nabla + \nabla^2$ c) $\nabla - 1$ d) none of these

   4) The solution of $(E-1)^3 u_n = 0$ is

      a) $u_n = c_1 + c_2 n + c_3 n^2$ b) $u_n = c_1 - c_2 + c_3 n^2$

      c) $u_n = c_1 + c_2 + c_3 n^2$ d) none of these

   5) The order of difference equation $y_{n+2} - 2y_{n+1} + y_n = 0$ is

      a) first   b) second   c) third   d) none of these

   6) The solution of $y_{n+2} - 4y_{n+1} + 4y_n = 0$ is

      a) $(c_1 + c_2 n) 2^n$ b) $(c_1 + c_2 n) 3^n$

      c) $(c_1 - c_2 n) 2^3$ d) none of these

P.T.O.

7) Simpson's $\left(\dfrac{3}{8}\right)^{th}$ rule is obtained by putting n = _____ in general quadrature formula.

   a) 1 b) 2 c) 3 d) 4

8) The exact value of $\int_0^1 \dfrac{1}{1+x} dx$ is

   a) 0.6931 b) 0.7031 c) 0.3169 d) 0.6831

9) If the given data is not equally spaced and interpolation is near the beginning of the data then _____ interpolation formula is used.

   a) Lagrange's b) Newton's divided difference

   c) Newton's forward difference d) None of these

10) Interpolation is the technique of estimating the value of a function for any

   a) Intermediate value of the variable b) Intermediate value of the constant

   c) Both a and b are true d) None of these

2. Attempt **any five** : **10**

   1) Evaluate $\Delta \tan^{-1} x$.

   2) With usual notation prove that $\nabla = 1 - E^{-1}$.

   3) Solve the difference equation $u_{n+3} - 5u_{n+1} + 6u_n = 0$.

   4) State Lagrange's interpolation formula.

   5) State Simpson's one-third rule.

   6) Define linear difference equation with constant coefficient.

3. A) Attempt **any two** of the following : **6**

   1) Evaluate $\Delta (e^x \log 2x)$.

   2) Find the polynomial f (x) by Lagrange's formula.

x	0	1	2	5
f (x)	2	3	12	147

   3) Evaluate $\int_0^6 \dfrac{1}{1+x^2} dx$ by using trapezoidal rule, take h = 1.

   B) Solve $y_{x+1}^2 - 3y_{x+1} y_x + 2y_x^2 = 0$. **4**

4. Attempt **any two** of the following : **10**

   1) Prove that :

      a) $E = e^{hD}$

      b) $\Delta = E - 1$

   2) Solve $y_{n+2} - 4y_{n+1} + 3y_n = 5^n$.

   3) Given that

x	0.1	0.2	0.3	0.4
y	1.10517	1.22140	1.3498	1.49182

   find $\dfrac{dy}{dx}$ at $x = 0.4$.

5. Attempt **any one** of the following : **10**

   1) If $y = f(x)$ takes the values y_0, y_1, y_2, ... y_n corresponding to the values x_0, x_1, x_2, ... x_n then prove that

   $$y_p = y_0 + p\Delta y_0 + \frac{p(p-1)}{2!}\Delta^2 y_0 + \frac{p(p-1)(p-2)}{3!}\Delta^3 y_0 + \ldots$$

   $$+ \frac{p(p-1)(p-2)\ldots(p-n+1)}{n!}\Delta^n y_0$$

   2) State and prove Simpson's $\left(\dfrac{3}{8}\right)^{th}$ rule hence evaluate $\int_0^6 \dfrac{4x}{(1+x)^2} dx$, take $h = 1$.

   _____

B.Sc. (Part – III) (Semester – VI) (New) Examination, 2016
STATISTICS (Special Paper – XIV)
Design of Experiments

Day and Date : Saturday, 26-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
            2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative from the following :   **10**

    i)   If different factorial effects are confounded in different replications then it is
         known as
         a) Partial confounding   b) Complete confounding
         c) Conservative confounding   d) None of these

    ii) In LSD with 6 treatments having 2 missing observations, the error degrees of
         freedom will be
         a) 20   b) 19
         c) 18   d) 17

    iii) Randomization in an experiment helps to eliminate
         a) Systematic influences   b) Human bias
         c) Dependence among observations d) All of these

    iv) Error sum of squares in RBD as compared to CRD using the same material is
         a) more   b) less
         c) equal   d) none of these

    v)   The analysis of SPD consists of
         a) Main-plot analysis   b) Sub-plot analysis
         c) Both a) and b)   d) Neither a) nor b)

vi) A CRD is also known as
  a) non-restrictional design
  b) one-restrictional design
  c) two-restrictional design
  d) none of these

vii) Local control is a device to maintain
  a) Homogeneity among blocks
  b) Homogeneity with in blocks
  c) Both a) and b)
  d) Neither a) nor b)

viii) An experimental design is
  a) a map of experiment
  b) a plan of experiment
  c) an architect of experiment
  d) none of these

ix) Missing observation in a CRD is to be
  a) estimated
  b) guessed
  c) deleted
  d) none of these

x) RBD is more efficient than CRD unless
  a) block variation is zero
  b) block variation is greater than zero
  c) block variation is less than zero
  d) none of these

2. Answer **any five** of the following :   **10**
  i) Explain the terms Treatment and Experimental units.
  ii) Define the efficiency of a design.
  iii) Explain the principle of randomization.
  iv) Describe CRD.
  v) Explain the missing plot technique.
  vi) Explain confounding in factorial experiment.

3. A) Answer **any two** of the following :   **6**
  i) Describe LSD. Give its layout.
  ii) Explain Yate's procedure of obtaining main effects and interactions in factorial experiment.
  iii) Explain Split Plot Design (SPD).

 B) What is RBD ? Give its ANOVA table.   **4**

4. Answer **any two** of the following : **10**

   i) Obtain the formula for estimating efficiency of LSD over RBD when rows are taken as blocks.

   ii) Obtain the formula for estimating one missing observation in LSD.

   iii) Explain the ANOVA technique for one-way classification.

5. Answer **any two** of the following : **10**

   i) Explain total confounding with respect to 2^3 factorial experiment.

   ii) What is factorial experiment ? Give mathematical model and ANOVA table for a 2^2 – factorial experiment arranged in RBD.

   iii) Give the mathematical model, assumptions and analysis of variance table in case of LSD.

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Seat
No.

B.Sc. III (Semester – VI) (New) Examination, 2016
GEOLOGY (Special Paper – XIV)
Pre-Cambrian Stratigraphy of India

Day and Date : Saturday, 26-3-2016   Total Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate full marks.
3) Draw **neat** labelled diagrams **wherever** necessary.

1. Fill in the blanks with correct answer from given options.   **10**

   1) Dharwarian rocks of manganese deposits occurs in Nagpur, Chhindwara and Bhandara district have been named as

      a) Iron-ore   b) Sausar   c) Chilpi   d) None of these

   2) 'Alwar series' belong to

      a) Delhi system   b) Bundelkhand gneiss

      c) Aravali system   d) None of these

   3) Bundelkhand gneisses belongs to _____ system.

      a) Archean   b) Cambrian   c) Cuddapah   d) Vindhyan

   4) Bhima series is a part of _____ Vindhyan.

      a) upper   b) middle   c) lower   d) none of these

   5) The Kurnool Series is

      a) of carboniferous age and is located in Karaal district of Haryana

      b) of lower Vindhyan age and occurs in Andhra Pradesh

      c) of Cuddapah age and occurs in Mysore

      d) none of the above

   6) Which one of the following series forms in the upper Cuddapah System ?

      a) Papaghani   b) Cheyair   c) Kistna   d) Kurnool

P.T.O.

7) The most common rocks in Archean System are
   a) marbles
   b) slates
   c) sandstone
   d) gneisses and schists

8) Eparchean unconformity is present between _____ and _____
   a) Archean; Aravalli
   b) Archean; Dharwar
   c) Archean, Cuddapah
   d) Archean; Vindhyan

9) Famous 'Makrana Marble' belongs to
   a) Delhi system
   b) Bundelkhand gneiss
   c) Aravali system
   d) Raialo series

10) Dimondiferous sandstone beds occurring at the base of Kurnool series is known as _____ beds.
    a) Malani
    b) Palnad
    c) Banaganapalli
    d) Pakhal

2. Answer **any five** of the following. **10**

   i) What are another names given to the Archean rocks ?

   ii) What is peninsular gneiss ?

   iii) Which iron ore containing rock is found in iron-ore series ?

   iv) Which one of the following is younger and oldest ? Raialo series, Aravalli system or The Banded Gneissic complex.

   v) Occurrences of Bhima series.

   vi) Which system in north India is equivalent of Cuddapah system ?

3. A) Answer **any two** of the following. **6**

   i) Describe Kaladgi series

   ii) Explain Sakoli series

   iii) Describe Fundamental gneisses.

B) Write answer of **any one**. **4**

i) Describe Ajabgarh series of Delhi system.

ii) Describe economic importance of Aravallis of Rajasthan.

4. Answer **any two** of the following. **10**

i) Describe in brief with stratigraphic sequence and lithology of Bhandar and Rewa series.

ii) Describe Delhi system.

iii) Describe in brief with stratigraphic sequence and lithology of Lower Cuddapah System.

5. Answer **any two** of the following. **10**

i) Describe in brief with stratigraphic sequence and lithology of Upper Vindhyan System.

ii) Describe in detail economic importance of Cuddaph System.

iii) Describe in brief with stratigraphic sequence, lithology of Kurnool System.

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Seat No.

B.Sc. – III (Semester – VI) Examination, 2016
MICROBIOLOGY (Special Paper – XIV) (New)
Microbial Biochemistry

Day and Date : Saturday, 26-03-2016　　　　　　　　　　Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) **All** questions are **compulsory**.

　　　　2) Figures to the **right** indicate **full** marks.

　　　　3) Draw **neat** labelled diagrams **wherever** necessary.

1. Rewrite the sentences by selecting correct answer from given alternatives.　**10**

   1) Enzymes are
      a) Biosensors　　b) Bireactors　　c) Biocatalysts　d) Biosystems

   2) When $V_o = \frac{1}{2} V_{max}$ then Km is equal to
      a) Enzyme concentration　　　　b) Substrate concentration
      c) ES concentration　　　　　　d) Product concentration

   3) _____ is initiation codon.
      a) AUG　　　　b) GUA　　　　c) UGA　　　　d) None of the above

   4) Bioluminescent organisms are present in
      a) Soil　　　　b) Air　　　　c) Fresh water　d) Marine water

   5) _____ acid contains pyrimidine nucleus and it is key intermediate in pyrimidine synthesis.
      a) Inosinic　　b) Orotic　　　c) Acetic　　　d) Citric

   6) _____ play important role $\beta - 1.4$, linkage formation between

      M-acetyl glucosamine and M-acetyl muramic acid.
      a) C_{55} lipid　　b) C_{73} lipid　　c) C_{16} lipid　　d) C_{36} lipid

   7) All enzymes are proteins except
      a) RNA polymerase　　　　　b) DNA polymerase
      c) DNA ligase　　　　　　　d) Ribozyme

P.T.O.

8) _____ is isoenzyme.
   a) Alcohol dehydrogenase
   b) Malate dehydrogenase
   c) Lactase dehydrogenase
   d) Citrate dehydrogenase

9) Catabolite repression was discovered by
   a) Emil Fischer
   b) J. Monod
   c) Kuhne
   d) Koshland

10) _____ amino acid is not used in protein synthesis.
   a) Methionine
   b) Tryptophan
   c) Arginine
   d) Citruline

2. Write **any five** of the following :   **10**
   1) What is luciferase ?
   2) Describe carbonysomes.
   3) Write on termination codons.
   4) What is translation ?
   5) Describe structure of nucleotide.
   6) Draw general structure of pyrimidine.
   7) Define operon.

3. A) Answer **any two** of the following :   **6**
      1) Explain symmetry model for allosteric enzymes.
      2) Write on proxmity and orientation.
      3) Assimilation of carbon.
   B) Write in detail on Electrophoresis.   **4**

4. Write answers **any two** of the following :   **10**
   1) Acid base catalysis.
   2) Phosphoketolase pathway.
   3) Methods of immobilization.

5. Write answers **any two** of the following :   **10**
   1) Extraction of enzymes.
   2) ED pathway.
   3) Describe protein synthesis in brief.

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Seat
No.

B.Sc. – III (Semester – VI) (New) Examination, 2016
ELECTRONICS (Special Paper – XIV)
Advanced Communication

Day and Date : Saturday, 26-3-2016　　　　　　　　　　　Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N. B.* :** 1) ***All questions are ***compulsory***.
　　　　　2) Figure to the ***right*** indicate ***full*** marks.
　　　　　3) ***Draw*** diagram ***wherever*** necessary.
　　　　　4) ***Use*** of log table and calculator is ***allowed***.

1. Select the correct alternatives for the following :　　　　　　　**10**

　i) Total internal reflection takes place if light ray strikes the interface at an
　　angle _____ critical angle.
　　a) Less than　　　　　　　　　b) Greater than
　　c) Equal to　　　　　　　　　　d) Both a) and b)

　ii) Photodiode operates with
　　a) Forward bias　　　　　　　　b) Reverse bias
　　c) Neither a) nor b)　　　　　　d) Either a) or b)

　iii) A circular orbit around the equator with 24 hours period is called
　　a) Elliptical orbit　　　　　　　b) Geostationary orbit
　　c) Polar orbit　　　　　　　　　d) Transfer orbit

　iv) Cellular telephone use _____ type of operation.
　　a) Simplex　　　　　　　　　　b) Half duplex
　　c) Full duplex　　　　　　　　　d) Triplex

　v) The fastest LAN topology is
　　a) Ring　　　　　b) Bus　　　　　c) Star　　　　　d) Tree

　vi) Earth station is used
　　a) To control satellite position in geostationary
　　b) To control T.V. satellite signal
　　c) To transmit the T.V. signals
　　d) To receive the T.V. signals

vii) The most common radar display is the
   a) Scan
   b) Colour circuit
   c) LCD
   d) Plan position indication

viii) Modem is the device
   a) To receive the signal
   b) To transmit the signal
   c) Both a) and b)
   d) None of these

ix) Gunn diode is the
   a) p – n junction semiconductor ordinary diode
   b) microwave semiconductor device
   c) photo diode semiconductor device
   d) none of these

x) The master control center for a cellular telephone system is the
   a) Cell site
   b) Mobile – telephone switching office
   c) Central office
   d) Branch office

2. Answer **any five** of the following :   **10**

   i) State any four application of optical fiber.

   ii) What is Apogee and Perigee in elliptical orbits in satellite communication.

   iii) What is the principle of working of radar ?

   iv) Give application of Internet.

   v) What is transmission line ?

   vi) Explain digital data communication.

3. A) Answer **any two** of the following :   **6**
   i) Give the types of fiber optic cable and explain any one.
   ii) Explain the concept of QPSK modem.
   iii) Explain working and principle of Gunn diode.

   B) What is computer network ? Explain LAN and WAN.   **4**

4. Answer **any two** of the following :   **10**

   i) Describe working of Klystron amplifier with neat diagram.

   ii) With the help of block diagram explain QAM.

   iii) With block diagram explain optical fiber communication.

5. Answer **any one** of the following :   **10**

   i) With neat block diagram explain working of pulsed radar system.

   ii) Explain with block diagram basic cellular system.

Seat
No.

B.Sc. (Part – III) (Semester – VI) Examination, 2016
COMPUTER SCIENCE (Special Paper – XIV) (New)
Advanced Java

Day and Date : Saturday, 26-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternatives :   **10**

   1) Which package provides many event classes and listener interfaces for event handling ?

      A) java.awt

      B) java.awt.Graphics

      C) java.awt.event

      D) none of the above

   2) The ActionListener interface is used for handling action events for

      A) JButton   B) JCheckbox

      C) JMenuItem   D) All of these

   3) By which method you can set or change the text in a Label ?

      A) setText()   B) getText()

      C) both A) and B)   D) none of the above

   4) JDBC technology-based drivers generally fit into how many categories ?

      A) 2   B) 3

      C) 4   D) 5

   5) _____ is used to access the stored procedures and function.

      A) Statement   B) Callable Statement

      C) Prepared Statement   D) Both A) and B)

6) The ResultSet.next method is used to move to the next row of the ResultSet, making it the current row.

   A) True   B) False

   C) Both A) and B)   D) None of the above

7) Abbreviate the term MIME

   A) Multilevel Internet Mail Extension

   B) Multipurpose Internet Mail extension

   C) Multiuse Information Mail Extension

   D) None of the above

8) The Jsp include directive is used to include the contents of any resource it may be

   A) jsp file

   B) html file

   C) text file

   D) all mentioned above

9) In which technology, we mix our business logic with the presentation logic ?

   A) Servlet   B) JSP

   C) Both A) and B)   D) None of the above

10) EJB (Enterprise Java Bean) is used to develop which type of applications in java ?

   A) Scalable   B) Robust

   C) Secured   D) All mentioned above

2. Solve **any five** :   **10**

   1) Define the term event and event source.

   2) What is the use of ImageIcon class.

   3) What are the advantages of Type-4 JDBC Driver ?

   4) What are the uses of servlet ?

   5) What is the use of declaration tag in jsp ? Write its syntax.

   6) Define EJB. Give its applications.

3. A) Solve **any two** : **6**

    1) Explain ResultSet interface used for JDBC.

    2) Explain RadioButton and Checkbox in swing.

    3) Explain the difference between doGet and doPost methods.

  B) Write a short note on session management in servlet. **4**

4. Solve **any two** : **10**

    1) Explain servlet life cycle.

    2) Explain entity bean with example.

    3) Write a program to implement ActionListener interface.

5. Solve **any two** : **10**

    1) Write a JDBC program to insert and display employee information from a database.

    2) Explain JApplet with example using swing.

    3) Write a JSP program that uses any two implicit objects.

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N. B. :   i) **All** questions are **compulsory**.
        ii) Figures to the **right** indicate **full** marks.
        iii) **Use** of log table or scientific calculator is **allowed**.
        iv) **Draw** neat diagrams **wherever** necessary.

1. Select correct alternative :   **10**

    i) Shells are characterised by the quantum number
       a) n   b) l
       c) m_l d) m_s

    ii) To explain the observed doublet fine structure of spectral lines. The concept introduced is of _____
       a) Orbital motion of electron
       b) Spin motion of electron
       c) Magnetic field produced at the electron
       d) Spatial quantization

    iii) If the coupling between l^* and s^* is not broken in an external magnetic field, then we observe _____
       a) Normal Zeeman effect   b) Anomalous Zeeman effect
       c) Paschen-Back effect   d) Stark effect

    iv) The vibrational spectra occur in _____
       a) Microwave region   b) Infrared region
       c) Visible and UV region   d) Visible region

    v) To study Raman effect, the optical system must be made up of _____
       a) Glass   b) CaF_2
       c) Calcite   d) Quartz

vi) If P is the momentum of particle, k is the propagation constant of the wave, then the relation satisfy the de-Broglie relation _____

a) $\hbar k$ b) $\dfrac{\hbar}{k}$ c) $P = \hbar \omega$ d) $P = \dfrac{\hbar}{\omega}$

vii) Which of the following condition will be obeyed by ψ ?

a) $|\psi| \rightarrow 0$ as $r \rightarrow \infty$ b) $|\psi| \rightarrow \infty$ as $r \rightarrow 0$

c) $|\psi| \rightarrow 0$ as $r \rightarrow 0$ d) $|\psi| \rightarrow \infty$ as $r \rightarrow \infty$

viii) The energy levels possessed by a linear harmonic oscillator are _____
  a) Infinite sequence discrete energy levels
  b) Exponential in nature
  c) Infinite sequence of discrete equidistance energy levels
  d) Continuous energy levels

ix) The zero point energy of linear harmonic oscillator is given by _____

a) $E_0 = 0$ b) $E_0 = \hbar \omega$

c) $E_0 = mc^2$ d) $E_0 = \dfrac{1}{2} \hbar \omega$

x) The momentum operator is given by _____

a) $\hat{P}_x = -i\hbar \dfrac{\partial}{\partial x}$ b) $\hat{P}_x = -i\hbar \dfrac{\partial}{\partial t}$

c) $\hat{P}_x = \dfrac{\hbar^2}{2m} \dfrac{\partial^2}{\partial x^2}$ d) $\hat{P}_x = i\hbar \dfrac{\partial}{\partial x}$

2. Answer **any five** of the following :   **10**

  i) Give electronic configuration of Sodium ($_{11}$Na).

  ii) State Zeeman effect and write its types.

  iii) What is Molecular bond ?

  iv) Obtain an expression for Hamiltonian operator.

  v) Explain zero point energy in brief.

  vi) What is an operator ? State expression for momentum operator.

3. A) Attempt **any two** : **6**

    i) Write note on Frank-Condon principle.

    ii) State characteristic properties of Raman lines.

    iii) Explain rotational energy levels.

  B) Give the physical significance of ψ. **4**

4. Attempt **any two** : **10**

    i) Give a brief account of spectral notations and optical series due to alkali atoms.

    ii) Derive Schrodinger's time independent wave equation.

    iii) Find the eigen value of L_z.

5. Attempt **any one** : **10**

    i) What is Paschen-Back effect ? Obtain an expression for term value. Explain Paschen – Back effect in principle series doublet with energy level diagram.

    ii) Using steady state Schrodinger wave equation for energy eigen values for the motion of a particle in one dimensional rigid box.

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Seat No.

B.Sc. (Part – III) (Semester – VI) (New) Examination, 2016
CHEMISTRY
Organic Chemistry (Special Paper – XV)

Day and Date : Monday, 28-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) **All** questions are **compulsory**.

2) Figures to **right** indicate **full** marks.

3) Draw **neat** labelled diagram and give equations **wherever** necessary.

1. Choose the most correct alternative for **each** of the followings :   **10**

   1) By passing a mixture of two parts of acetylene and one part of hydrogen cyanide over red hot tube _____ is formed.

      a) Pyrrole   b) Pyridine

      c) Indole   d) Furan

   2) Five membered heterocycle containing nitrogen and sulphur is _____

      a) Oxazole   b) Pyrazole

      c) Indole   d) Thiazole

   3) Weerman's reaction is used to _____

      a) chain shortening of aldose   b) chain lengthening of ketose

      c) chain lengthening of aldose   d) inter conversions of aldose

   4) Methyl isocyanate is required for the synthesis of _____

      a) Ethophan   b) Sevin

      c) Carbaryl   d) Cypermetherin

5) Name the following compound.

   a) Maltose   b) Lactose   c) Sucrose   d) Galactose

6) The disease xerophthalmia is caused due to deficiency of _____
   a) Vitamin – A   b) Thyroxine   c) Vitamin – C   d) Vitamin – D

7) How many iodine atoms are present in Thyroxine ?
   a) 3   b) 2   c) 4   d) 6

8) What is the name of following dye ?
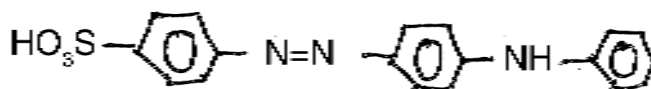
   a) Orange – IV   b) Orange – II
   c) Methyl orange   d) Congo red

9) Paludrin is used as _____
   a) Antileprotic agent   b) Antimalerial agent
   c) Antidiabetic agent   d) Antibacterial agent

10) Name the following drug
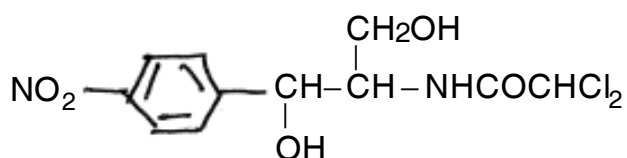
   a) Amoxycillin   b) Oxacillin
   c) Chloromycetin   d) Penicillin-G

2. Attempt **any five** of the followings : **10**

   i) Predict the product of following reactions.
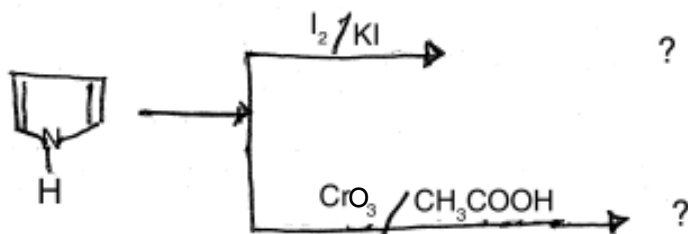
   ii) How will you prove adrenaline is derivative of catechol ?

   iii) Explain why phenolphthalein has pink colour in alkaline medium.

   iv) Give structure and uses of methoxychlor.

   v) Give qualities of good dye.

   vi) Prove the presence of five double bonds in Vitamin-A.

3. A) Attempt **any two** of the followings : **6**

   i) What is action of following reagents on Quinoline.

   a) $NaNH_2 / \Delta$ b) $n\text{-}C_4HgLi$ c) $SO_3/H_2SO_4, 220°C$

   ii) How will you convert fructose into Glucose ?

   iii) Give synthesis of Tolbutamide.

   B) Give synthesis and uses of Indole-3-acetic acid. **4**

4. Attempt **any two** of the followings : **10**

   i) Discuss Skraup's synthesis of Quinoline.

   ii) Discuss the configuration D-glucose from D-arabinose.

   iii) What are azo dyes ? Give synthesis of Malechite green.

5. Attempt **any two** of the following : **10**

   i) Explain Kiliani synthesis.

   ii) Discuss structure of Thyroxine on the basis of analytical ground.

   iii) Give synthesis and uses of Ibuprofen.

Seat No.

B.Sc. III (Semester – VI) Examination, 2016
BOTANY (Special Paper – XV) (New)
Microbial Genetics, Plant Breeding and Biostatistics

Day and Date : Monday, 28-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Note :   1) *All* questions are *compulsory.*
       2) *All* questions carry *equal* marks.
       3) Draw *neat* labelled diagrams *wherever* necessary.
       4) Figures to the *right* indicate *full* marks.

1. Rewrite the following sentences by selecting correct alternative :   **10**

   1) Viruses are believed to be _____
     a) living organisms
     b) non-living organisms
     c) a transitional group between living and non living world
     d) living organisms which have lost power of multiplication

   2) Tobacco Mosaic Virus (TMV) is _____
     a) rod shaped   b) disc shaped
     c) helicoid   d) tadpole shaped

   3) Viruses that infect bacteria, multiply and cause their lysis are called _____
     a) lysosomes   b) lipolytic   c) lytic   d) lysogenic

   4) For the first time, the bacteria were observed by _____
     a) Robert Hook   b) A.V. Leeuwenhoek
     c) W.H. Stanley   d) Louis Pasteur

   5) Which of the following term is not concerned with genetic recombination in bacteria ?
     a) Transformation   b) Transduction
     c) Conjugation   d) Translation

P.T.O.

6) The hereditary material present in the bacterium *E.Coli* is
   a) RNA
   b) RNA-complex
   c) ss-DNA
   d) ds-DNA

7) The greatest threat to genetic diversity in a agricultural crop is _____
   a) introduction of high yielding varieties
   b) extensive use of fertilizers
   c) extensive use of insecticides
   d) extensive mixed cropping

8) Reason of fast speciation in present day crop plants is due to _____
   a) mutation
   b) isolation
   c) polyploidy
   d) sexual reproduction

9) Mating between two individuals differing in genotype to produce genetic variation is called
   a) domestication   b) introduction   c) hybridization   d) mutation

10) Which of the following Bt crop is being grown in India by the farmers ?
    a) Brinjal   b) Soyabean   c) Maize   d) Cotton

2. Answer **any five** of the following :   **10**

   1) What is 'Pure-line' selection ? In which crop it is applied ?

   2) List the advantages of mass selection.

   3) What is the advantage of clonal selection over mass and pure – line selections ?

   4) Give the definition of median with a formula.

   5) Draw and label Tobacco Mosaic Virus (TMV).

   6) Define plant introduction and give its types.

3. A) Answer **any two** of the following :   **6**

   1) What are breeding objectives in the sugar cane crop ?

   2) Calculate mean from the following data.
      10, 8, 20, 22, 18

   3) In what type of crop plants the mass, pure – line and clonal selections are applied ? Discuss giving examples of crops in each case.

   B) Define the term 'hybridization' and state its objectives.   **4**

4. Answer **any two** of the following : **10**

   1) Write an essay on plant breeding.

   2) Name the different types of crosses made in the cross – pollinated crops and give a brief account of one with features.

   3) Define polyploidy and add a note on role of polyploidy in plant breeding.

5. Answer **any two** of the following : **10**

   1) Describe the pedigree method and give the advantages and disadvantages of pedigree method.

   2) Discuss the method of mutation breeding.

   3) Give an account of breeding work done in India on cotton and list some of the high yielding varieties which have been released recently.

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Seat No.

B.Sc. (Part – III) (Semester – VI) (New) Examination, 2016
ZOOLOGY (Special Paper – XV)
Molecular Biology and Biotechnology

Day and Date : Monday, 28-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : i) **All** questions are **compulsory**.
           ii) Figures to the **right** indicate **full** marks.
           iii) Draw neat labelled diagrams **wherever** necessary.

1. Select the appropriate answer from **each** of the following and rewrite the sentence :   **10**

   1) The process of addition of 200-300 Adenine residues towards 3'-end of eukaryotic m-RNA is known as
      a) Capping   b) Methylation
      c) Polyadenylation   d) Polyresiduation

   2) DNA damage caused by UV light is known as
      a) Pyrimidine dimer   b) Purine dimer
      c) Double stranded break   d) Physical damage

   3) _____ enzymes cleave DNA at specific selected sites only.
      a) DNase   b) Restriction Endonuclease
      c) RNase   d) Restriction Exonuclease

   4) _____ technique is used to detect presence of target unknown protein in a given sample.
      a) Southern Blotting   b) Northern Blotting
      c) Western Blotting   d) Eastern Blotting

   5) _____ discovered the technique of DNA fingerprinting.
      a) Kohler and Milstein   b) Dr. Alec. Jeffreys
      c) Karry Mullis   d) Karl Landsteiner

   6) _____ technology is used for synthesis of monoclonal antibodies.
      a) PCR   b) ELISA   c) Hybridoma   d) Cloning

   7) ELISA stands for
      a) Enzyme Linked Immuno Sorbent Assay
      b) Enzyme Linked Immuno Solvent Assay
      c) Enzyme Linked Immuno Solute Assay
      d) Enzyme Linked Immuno Synthesis Assay

8) _____ is a technique is used in forensics and police department.
   a) DNA Chip
   b) DNA Fineprinting
   c) DNA Fingerprinting
   d) DNA Footprinting

9) RNA polymerase binds to _____ region during initiation of transcription.
   a) Promoter
   b) Terminator
   c) Enhancer
   d) Codons

10) Initiation codon AUG codes for _____ amino acid.
    a) Lysine
    b) Histidine
    c) Methionine
    d) Arginine

2. Answer **any five** of the following :   **10**
   1) Cosmids
   2) Western blotting
   3) Translation
   4) Conjugation
   5) DNA Probes
   6) Cloning.

3. A) Answer **any two** of the following :   **6**
      1) Explain the mechanism of splicing of introns.
      2) Discuss applications of biotechnology in medicine.
      3) Explain plasmids as cloning vectors.

   B) Explain the properties of Genetic code.   **4**

4. Answer **any two** of the following :   **10**
   1) Discuss the process of transcription.
   2) Explain the technique and applications of Southern blotting.
   3) Discuss the role of restriction enzymes, DNA Ligase and DNA polymerase in recombinant DNA technology.

5. Answer **any one** of the following :   **10**
   1) Describe transformation experiment as an evidence for DNA as genetic material.
   2) Define hybridoma technology and discuss process for synthesis of monoclonal antibodies.

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SLR-W – 303

Seat No.	

B.Sc. – III (Semester – VI) (New) Examination, 2016
MATHEMATICS (Special Paper – XV)
Integral Transform

Day and Date : Monday, 28-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

> **N. B. :**   1) **All** questions are **compulsory**.
>   2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative of the following :   **10**

   1) $L\{e^{at}\, t^n\}$ is equal to _____

      a) $\dfrac{n!}{(p+a)^n}$ b) $\dfrac{n!}{(p-a)^n}$ c) $\dfrac{n!}{(p-a)^{n+1}}$ d) $\dfrac{n!}{(p+a)^{n+1}}$

   2) If $L\{F(t)\} = F(s)$ then $L\left\{\dfrac{F(t)}{t}\right\} =$ _____

      a) $\displaystyle\int_0^\infty f(x)\,dx$ b) $\displaystyle\int_s^\infty f(x)\,dx$ c) $\displaystyle\int_0^t f(x)\,dx$ d) $\displaystyle\int_1^\infty f(x)\,dx$

   3) $L\{e^t \cos t\}$ is equal to _____

      a) $\dfrac{s-1}{s^2-2s+2}$ b) $\dfrac{1}{s^2-2s+2}$ c) $\dfrac{s+1}{s^2+2s+2}$ d) $\dfrac{1}{s^2+2s+2}$

   4) The final value theorem is

      a) $\displaystyle\lim_{t\to\infty} F(t) = \lim_{s\to 0} sf(s)$ b) $\displaystyle\lim_{t\to 0} F(t) = \lim_{s\to\infty} sf(s)$

      c) $\displaystyle\lim_{t\to\infty} F(t) = \lim_{s\to\infty} sf(s)$ d) None of these

   5) If $L^{-1}\{F(p)\} = F(t)$ then $L^{-1}\{f(ap)\} =$ _____

      a) $\dfrac{1}{a} F(at)$ b) $\dfrac{1}{a} F(t/a)$ c) $a\, F(at)$ d) $a\, F(t/a)$

6) $L^{-1}\left\{\dfrac{n!}{p^{n+1}}\right\} = $ _____

   a) t^n b) t^{n+1} c) $n! \, t^n$ d) $\dfrac{\overline{n+1}}{t^{n+1}}$

7) $1 * 1 * 1 * 1 \ldots * $ (n times) is equal to _____

   a) t^{n-1} b) $\dfrac{t^{n-1}}{(n-1)!}$ c) $\dfrac{t^{n-1}}{n!}$ d) $\dfrac{t^n}{n!}$

8) If $y = y(n, t)$ then $L\left\{\dfrac{\partial y}{\partial x}\right\} = $ _____

   a) $x \, \overline{y}(x, s) + y(x, 0)$ b) $s \, \overline{y}(x, s) - y(x, 0)$

   c) $s \, \overline{y}(x, 0) - y(x, s)$ d) $s \, \overline{y}(x, s)$

9) If $y = y(x, t)$ then $L\left\{\dfrac{\partial^2 y}{\partial t^2}\right\} = $ _____

   a) $s^2 \, \overline{y}(x, s) - sy(x, 0) - y_t(x, 0)$ b) $s^2 \, \overline{y}(x, s) + sy(x, 0)$

   c) $s^2 \, \overline{y}(x, s) - sy_t(x, 0) - y(x, 0)$ d) $s^2 \, \overline{y}(x, s)$

10) $L^{-1}\left\{\dfrac{3}{p^2 - 3}\right\} = $ _____

   a) $\sqrt{3} \, \text{Sin} \, h \, \sqrt{3} \, t$ b) $\text{Sin} \, h \, \sqrt{3} \, t$ c) $\dfrac{1}{\sqrt{3}} \text{Sin} \, h \, \sqrt{3} \, t$ d) $\dfrac{1}{\sqrt{3}} \text{Cos} \, h \, \sqrt{3} \, t$

2. Solve **any five** of the following : **10**

   1) Find $L\{e^{-t}(3 \, \text{Sin} \, h \, 2t - 5 \cos h \, 2t)\}$.

   2) Evaluate $L^{-1}\left\{\dfrac{P \, e^{\frac{-2\pi P}{3}}}{P^2 + 9}\right\}$.

   3) Find $L^{-1}\left\{\dfrac{P}{2P^2 - 8}\right\}$.

4) If $L^{-1}\left\{\dfrac{P^2-1}{\left(P^2+1\right)^2}\right\} = t\cos t$ then find $L^{-1}\left\{\dfrac{9P^2-1}{\left(9P^2+1\right)^2}\right\}$.

5) Find $L\left\{\cos^2 at\right\}$.

6) Evaluate $L\left\{\dfrac{t\left(1-\cos at\right)}{a^2}\right\}$.

3. A) Solve **any two** of the following :   **6**

  1) Find $L^{-1}\left\{\dfrac{P}{\left(P^2+a^2\right)^2}\right\}$.

  2) State and prove change of scale property for Laplace transform.

  3) Solve $(D^2 - 2D + 2)\,y = 0$, $y = DY = 1$ when $t = 0$.

B) Use convolution theorem to find $L^{-1}\left\{\dfrac{P^2}{\left(P^2+4\right)^2}\right\}$.   **4**

4. Solve **any two** of the following :   **10**

  1) Evaluate $L^{-1}\left\{\dfrac{4P+5}{(P-1)^2\,(P+2)}\right\}$.

  2) Prove that $\displaystyle\int_0^\infty t^3\, e^{-t}\, S\text{int}\, dt = 0$.

  3) Solve $(D^2 + 3D + 2)\,x = 0$ with the conditions $x = x_0$ and $Dx = x_1$ at $t = 0$.

5. Solve **any one** of the following :   **10**

  1) Solve, $(D - 2)x - (D + 1)y = 6\,e^{3t}$

           $(2D - 3)x + (D - 3)y = 6\,e^{3t}$

   with the conditions that $x(0) = 3$ $y(0) = 0$.

  2) i) If $F(t) = t^2$ $0 < t < 2$ and $F(t + 2) = F(t)$. Find $L\{F(t)\}$.

    ii) Find $L^{-1}\left\{\dfrac{3P^3 - 3P^2 - 40\,P + 36}{\left(P^2 - 4\right)^2}\right\}$.

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Seat
No.

B.Sc. (Part – III) (Semester – VI) Examination, 2016
STATISTICS (Special Paper – XV) (New)
Limit Theorems, Reliability and Queuing Theory

Day and Date : Monday, 28-3-2016   Total Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : i) **All** questions are **compulsory** and figures to the **right** indicate **full** marks.

ii) **Use** of scientific calculators and statistical tables is **allowed**.

1. Choose most appropriate alternative from those given in each case : **10**

   i) If (X_n), $\{Y_n\}$ be two sequences of random variables (r.vs.) with $X_n \xrightarrow{Law} x$ and $Y_n \xrightarrow{Law} a$ where X is a r.v. and a is a constant, then _____

   a) $(X_n Y_n) \xrightarrow{Law} ax$ b) $(X_n Y_n) \xrightarrow{Law} xy$

   c) $(X_n Y_n) \xrightarrow{Law} x$ d) $(X_n Y_n) \xrightarrow{Law} a$

   ii) In $M/M/1 : \infty/FIFO$ model, probability that there are n customers in the system is _____

   a) ρ^n b) $1-\rho^n$ c) $(1-\rho)\rho^{(n-1)}$ d) $(1-\rho)\rho^n$

   iii) If $\rho < 1$ and P_n = steady state probability that there are n customers in the system at time t, then n is a _____ r.v.
   a) Poisson   b) Exponential   c) Normal   d) Geometric

   iv) If $\phi(x)$ is the structure function of a system then $\phi(x)$ is _____ r.v.
   a) Uniform   b) Bernoulli   c) Poisson   d) Normal

   v) Suppose $R_i(t)$ = reliability of ith component for i = 1, 2 and R(t) is reliability of a parallel system of 2 independent components, then

   a) $R(t) \geq R_1(t)$ b) $R(t) \geq R_2(t)$

   c) $R(t) \geq Max\{R_1(t), R_2(t)\}$ d) $R(t) \geq Min\{R_1(t), R_2(t)\}$

P.T.O.

vi) For coherent system $\phi(0) = $ _____

     a) 0   b) 1   c) 2   d) None of these

vii) If $\{X_n, n \geq 1\}$ is a r.s. from $\chi^2_{(1)}$ distribution then the asymptotic distribution of sample mean is _____

     a) $\chi^2_{(1)}$ b) $\chi^2_{(n)}$ c) normal   d) none of these

viii) According to Chebyscheve's inequality, the probability that _____

     a) X differing from its mean by more than two standard deviations is ≤ 0.75

     b) X will lie within two standard deviations of its mean is ≥ 0.75

     c) X will lie within two standard deviations of its mean is ≥ 0.25

     d) X will lie within two standard deviations of its mean is ≥ 0.95

ix) In usual notations pdf of first order statistic is given by _____

     a) $n\left[F(y)\right]^{(n-1)} f(y)$ b) $n!\left[F(y)\right]^{(n-1)} f(y)$

     c) $nf(y)\left[1-F(y)\right]^{(n-1)}$ d) $n!f(y)\left[1-F(y)\right]^{(n-1)}$

x) Which of the following statement/s is/are correct ?
We can find distribution of _____ using order statistics of a random sample of odd size.

     i) $\min\{X_i\}$
     ii) $\text{Max}\{X_i\}$
     iii) Sample median
     iv) Sample range
     a) only i)   b) only i) and ii)
     c) only i), ii) and iv)   d) all of these

2. Attempt **any five** from the following :   **10**

     a) If $\lambda = 12$ per hour and $\mu = 15$ per hour in M / M / 1 model then find average length of queue of the system.

     b) In usual notations state the joint pdf of (Y_r, Y_s) $(r < s)$.

     c) If X is a B(10, 0.4) r.v. then find $P\left[|X - \mu| > 3\sigma\right]$, where $\mu = E(X)$ and $\sigma^2 = V(X)$.

     d) State the relationship between survival function and hazard function.

e) For a series system of three components say A, B, C find all the minimal cut sets and minimal path sets.

f) Suppose X_i are iid $\chi^2_{(1)}$ r.vs. i = 1, 2, ..., 200. Then using CLT obtain approximately $P\left[\Sigma X_i > 220\right] \cdot \left[\phi(1) = 0.8434\right]$.

3. A) Attempt **any two** from the following :   **6**

   i) Let $X_n \xrightarrow{\ P\ } x$ as $n \to \infty$ and $Y_n \xrightarrow{\ P\ } y$ as $n \to \infty$ then show that

     $(X_n + Y_n) \xrightarrow{\ P\ } (x + y)$ as $n \to \infty$.

   ii) Show that hazard rate is constant for exponential distribution.

   iii) Explain steady state and transient state in queuing theory.

B) Let a random sample of size 4 is taken from U(0, 1) distribution. Find the distribution of third order statistic. Identify the distribution.   **4**

4. Attempt **any two** from the following :   **10**

A) Explain the assumptions made in queuing model $(M/M/1) : (\infty/FCFS)$.

B) Does there exists a r.v. X for which $P\left[\mu - 3\sigma < X < \mu + 3\sigma\right] = 0.85$? Where $E(X) = \mu$ and $V(X) = \sigma^2$. Justify using exp(2) distribution.

C) Obtain hazard function and survival function if the life time distribution is $\exp(\lambda)$.

5. Attempt **any one** from the following :   **10**

A) Let Y_n be the nth order statistic corresponding to a random sample from U(0,1) distribution. Find the distribution of Y_n. Further test the convergence in probability of Y_n to 1 as $n \to \infty$.

B) Let X be $P(\lambda)$ r.v. Let Y be standard Poisson r.v. defined on X. Show that limiting distribution of Y is N(0, 1). Hence show that sequence of standard Poisson distributions converges in distribution to standard normal distribution.

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Seat No.

B.Sc. – III (Semester – VI) (New) Examination, 2016
GEOLOGY (Special Paper – XV)
Phanerozoic Stratigraphy of India

Day and Date : Monday, 28-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
       2) Figures to the **right** indicate **full** marks.
       3) **Draw** neat labelled diagrams **wherever** necessary.

1. Fill in the blanks with correct answer from given options :   **10**

   1) Pick out the formation which is devoid of coal.
     a) Barakar stage   b) Raniganj stage
     c) Iron stone stage   d) None of these

   2) In which of the following Era of Indian Stratigraphy Jurassics of Kutch were formed ?
     a) Purana   b) Aryan   c) Dravidian   d) Archaean

   3) The Gondwana system was formed during
     a) Upper Carboniferrous – Jurassic   b) Upper Carboniferrous – Cretaceous
     c) Permian – Jurassic   d) Permian – Eocene

   4) The lower Gondwana system includes _____ series.
     a) Talchir   b) Umia   c) Jabalpur   d) Rajmahal

   5) Which one of the following Cretaceous rocks of South India is youngest ?
     a) Utatur   b) Trichuiopoly   c) Ariyalur   d) None of these

   6) 'Chikkim limestone', belongs to
     a) Eocene rocks of Kashmir   b) Cretaceous of Spiti
     c) Pre Cambrinas of Sikkim   d) Jurassics of Spiti

   7) Lithologicaly upper Gondwana constitute _____
     a) Conglomerate and shale   b) Limestone and shale
     c) Laterite and shale   d) Sandstone and shale

   8) Inter-trappean bed are absent in _____ traps of Deccan traps.
     a) Upper   b) Middle   c) Lower   d) None of the above

9) Jurassic rocks of Cutch are overlaid by _____
   a) Deccan Traps
   b) Gondwana
   c) Salt range
   d) None of these

10) In Gondwana succession the first evidence of cold climate is obtained from
    a) Panchet formation
    b) Talchir formation
    c) Damuda formation
    d) Rajmahal series

2. Answer **any five** of the following : **10**

   i) What are series included in Triassic of Spiti ?

   ii) Fossils found in Inter-trappean beds.

   iii) In which system Maleri series found ?

   iv) What is the age of Neobolus beds ?

   v) Names of series in upper Gondwana.

   vi) On which rock, Cambrian Strata of Spiti lies over ?

3. A) Answer **any two** of the following : **6**
      i) What is the stratigraphical significance of inter-trappean beds ?
      ii) Explain Umaria marine beds of Gondwana system.
      iii) What is Barren measures ?

   B) Write answer of **any one** : **4**
      i) Flora and fauna found in Upper, Lower, Middle, Gondwana system.
      ii) Trias of Spiti.

4. Answer **any two** of the following : **10**
   i) Describe in detail Kioto limestones.
   ii) Describe in brief with stratigraphic sequence and lithology of Deccan Traps.
   iii) Describe the nature of Siwalik deposits.

5. Answer **any two** of the following : **10**
   i) Describe in brief with stratigraphic sequence and lithology of Rajmahal series.
   ii) Describe in brief with stratigraphic sequence and lithology of Siwalik system.
   iii) Write a detailed account on Jurassic of Cutch.

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Seat No.	

B.Sc. – III (Semester – VI) (New) Examination, 2016
MICROBIOLOGY
Special Paper – XV : Environmental Microbiology

Day and Date : Monday, 28-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N. B. :   1) **All** questions are **compulsory**.
             2) **Draw** neat labelled diagram **wherever** necessary.
             3) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences by selecting correct alternatives given below :   **10**

    i) _____ are non-biodegradable.

       a) Agrochemicals   b) Radioactive substances

       c) Fertilizers   d) Crop waste

   ii) _____ protect us from harmful effect of ultraviolet radiations.

       a) Clouds   b) Thick layer of CO_2

       c) Ozone   d) Smog

  iii) Respiratory diseases are caused due to _____

       a) H_2S b) Methane

       c) N_2 d) None of the above

   iv) _____ is a photochemical oxidant.

       a) PAN   b) SO_3 c) DDT   d) CO_2

    v) Most hazardous metal pollution of automobile exhaust is _____

       a) Mercury   b) Lead   c) Iron   d) Copper

   vi) Study of animals in germ free environment is known as _____

       a) Biology   b) Geology

       c) Gnotobiology   d) Geomicrobiology

  vii) Dyes are common in waste from _____ industry.

       a) Sugar   b) Dairy   c) Distillery   d) Textile

viii) _____ is the main cause of Eutrophication.

    a) Animal population   b) Algal mass

    c) Pollutants   d) Reduction in DO

ix) Hiroshima-Nagasaki tragedy is a case of _____ pollution.

    a) Soil   b) Radioactive   c) Metal   d) Air

x) If BOD of a river is high, it means that the river _____

    a) Is very polluted   b) Is not polluted

    c) Gets least amount of light   d) Does not have green plants

2. Answer **any five** of the following: **10**

   i) Give significance of ozone.

   ii) What is bioremediation ?

   iii) Give sources of air pollution.

   iv) Define term BOD.

   v) Define potable water.

   vi) What is photochemical smog ?

   vii) Give the list of animals used in gnotobiosis.

3. A) Answer the following questions in brief (**any two**) :   **6**

   i) Explain Beed bubler.

   ii) Explain control of Eutrophication.

   iii) Give characteristics of waste from paper and pulp industry.

B) Explain microorganisms as bioindicators of fecal pollution.   **4**

4. Answer **any two** of the following :   **10**

   i) Explain characteristics of marine environment.

   ii) What is bioleaching ? Explain bioleaching of copper.

   iii) Write an essay on 'bioaersal control'.

5. Answer **any two** of the following :   **10**

   i) Write an essay on routine bacteriological analysis of water.

   ii) Write on essay on Biological safety.

   iii) Write an essay on characteristics and treatment of waste water from dairy industry.

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Seat No.

B.Sc. – III (Semester – VI) (New) Examination, 2016
ELECTRONICS (Special Paper – XV)
Embedded System Design

Day and Date : Monday, 28-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** and labelled diagram **wherever** necessary.
4) **Use** of log table is **allowed**.

1. Select correct alternatives from the following : **10**

   1) The data range of the float type variable is _____ byte.

   a) 4   b) 2   c) 1   d) 8

   2) Which of the following is the superloop statement ?

   a) While (10)   b) While (1)   c) While (0)   d) While (100)

   3) In embedded C program _____ file must be included.

   a) embedded.h   b) windows.h   c) reg 51.h   d) RTs.h

   4) For displaying the data on LCD the _____ code of the character should be send.

   a) ASCII   b) Hexadecimal

   c) Binary   d) All of these

   5) The opto-coupler is the suitable device to _____ the peripherals to microcontrollers.

   a) couple   b) connect   c) shield   d) isolate

   6) The address of first line-first character of the 16×2 LCD is _____

   a) COH   b) 80 H   c) 90 H   d) AOH

   7) The digital to analog converter 0808 has _____ bit resolution.

   a) 16   b) 4   c) 8   d) None of these

   8) To select the band rate for serial communication _____ time is used.

   a) Timer 1   b) Timer 0   c) Timer 2   d) All of these

P.T.O.

9) Flashmagic is the tool used for _____

   a) development of program for embedded system

   b) programming of the microcontroller

   c) assembly language programming

   d) all of these

10) Which of the following line driver is used for serial data transfer to the computer.

   a) 74244   b) RS 232   c) Max 232   d) 74245

2. Answer **any five** of the following :   **10**

  i) Give basic architecture of an embedded system.

  ii) Draw clock and reset circuit for 89V51.

  iii) Mention the expressions in C language.

  iv) Draw circuit diagram for interfacing of 7-segment display to the 89V51.

  v) Define the terms constants and variables in C-language.

  vi) Give the structure of an embedded C program.

3. A) Answer **any two** of the following :   **6**

   i) Write a note on superloop.

   ii) Write a program in embedded C language to configure part 2 in input mode.

   iii) Describe the interfacing of relay to microcontroller.

  B) Write program in embedded C to generate square wave at any port pin of the microcontroller.   **4**

4. Answer **any two** of the following :   **10**

  i) Describe interfacing of ADC to microcontroller.

  ii) Mention steps involved in development of program in embedded C language.

  iii) Describe the interfacing of 16×2 LCD.

5. Answer **any one** of the following :   **10**

  i) a) Write a program in embedded C to generate time delay by using timer.

    b) Write a note on interfacing of opto-coupler.

  ii) Define the term an embedded system. Describe with suitable block diagram the minimum hardware required for an embedded system.

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Seat No.

B.Sc. – III (Semester – VI) (New) Examination, 2016
COMPUTER SCIENCE
Operating System – II (Special Paper – XV)

Day and Date : Monday, 28-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) *All* questions are *compulsory*.
                            2) *Figures to the* **right** *indicates* **full** *marks.*

1. Choose the correct alternative.   **10**

   1) How you can add a new user 'student' to your system ?
      A) useradd student   B) adduser student
      C) only A   D) both A and B

   2) What command is used with vi editor to search a pattern in the forward direction ?
      A) ??   B) //   C) /   D) ?

   3) The command chmod 542 letter is equivalent to
      A) chmod ugo + rwx letter   B) chmod u = rx, g = r, o = w letter
      C) chmod letter = 542   D) chmod ugo + 542 letter

   4) How would you sort a file called 'shop' by column 5 ?
      A) sort – k 5 shop   B) sort – n 5 shop
      C) sort – f 5 shop   D) sort – c 5 shop

   5) How do you shell execute a command in the background ?
      A) Put and symbol at the end of the command line
      B) Key in fg followed by the command name
      C) Press Ctrl + c after you have keyed in the command
      D) Press Ctrl + d after you have keyed in the command

   6) The command used to multiply two numbers n1 and n2 is
      A) mul n1 * n2   B) `expr $n1\*$n2`
      C) echo n1 * n2   D) n1 * n2

P.T.O.

7) The tar command is used for
   A) Create compressed archives of directories and files
   B) Extract directories and files from archives
   C) Both A and B
   D) None of the above

8) _____ is interface between shell and computer hardware.
   A) Kernel   B) Command interpreter
   C) User   D) All of the above

9) Which of the following command is used to mount NFS file systems ?
   A) nfsmount   B) nfsumount
   C) mount   D) all of the above

10) To mount remote devices you must put an entry into the file
   A) /etc/imports   B) /etc/exports
   C) /dev/imports   D) /dev/exports

2. Answer **any five** of the followings.   **10**

   1) What is inode number ?

   2) What is shell ?

   3) List out all file types.

   4) List out atleast four system defined shell variable name.

   5) How to kill a process ?

   6) Write syntax of "case statement" in Linux.

   7) Explain any one communication commands.

3. A) Answer **any two** of the followings.   **6**

   1) Explain following commands with examples.
   a) tail   b) cut   c) mv

   2) Discuss Network File System (NFS).

   3) Describe X-window system.

   B) Write a shell script to entered number is Armstrong or not.   **4**

4. Answer **any two** of the followings. **10**

   1) What is Kernel ? Give its function.

   2) What is shell variable ? Describe Rules for Declare Shell Variable.

   3) Explain grep command with its options.

5. Answer **any two** of the followings. **10**

   1) Describe Exit mode with all operations from vi editor.

   2) How chmod used for a set different permissions to file and directories ?

   3) How to mounting hard drives partitions ?

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Seat No.	

B.Sc. (Part – III) (Semester – VI) (New) Examination, 2016
PHYSICS (Special Paper – XVI)
Electronics and Instrumentation

Day and Date : Tuesday, 29-3-2016　　　　　　　　　　　Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) ***All*** questions are ***compulsory***.
　　　　　　　　 2) Figures to the ***right*** indicate ***full*** marks.
　　　　　　　　 3) ***Use*** of calculator or log table is ***allowed***.
　　　　　　　　 4) Neat diagrams must be drawn ***wherever*** necessary.

1. Select the correct alternative from the following : **10**

   i) _____ is the ratio of change in input offset current to the change in temperature.

   a) Input offset current drift

   b) Input offset voltage drift

   c) Slew rate

   d) Common mode input impendence

   ii) The ideal input impedance of Op-Amp is _____

   a) Infinite　　　　　　　　　　　b) High

   c) Negative　　　　　　　　　　　d) Zero

   iii) The frequency of unsymmetrical rectangular wave form of an astable multivibrator using 555 timer IC is given by

   a) $\dfrac{0.72}{CR_A}$　　　　　　　　　b) $\dfrac{1.44}{CR_A}$

   c) $\dfrac{1.44}{C(R_A + R_B)}$　　　　　　　d) $\dfrac{1.44}{C(R_A + 2R_B)}$

iv) In an astable multivibrator using 555 timer IC, the capacitor always charges between

a) 0 and V_{CC}

b) 0 and 2/3 V_{CC}

c) 1/3 V_{CC} and 2/3 V_{CC}

d) 0 and 1/3 V_{CC}

v) A p-n-p-n diode is fabricated from

a) Germanium (Ge) only

b) Silicon (Si) only

c) Germanium (Ge) and Silicon (Si)

d) Gallium arsenide (GaAs)

vi) A diac is a _____ terminal device.

a) Two   b) One   c) Three   d) Four

vii) In LED displays, _____ Semiconductor material is used to produce red colour.

a) GaAs   b) GeAs   c) SiAs   d) SiP

viii) The principle of change in electrical resistance with temperature is used in _____ transducer.

a) Mechanical transducer   b) Resistance transducer

c) Thermocouple transducer   d) Radiant energy transducer

ix) The ability of transducer to retain its performance throughout its specified operating life and storage life is known as

a) Dead hand   b) Stability

c) Drift   d) Sensitivity

x) Scanning electron microscope uses _____ from a sample for imaging.

a) Auger electrons   b) Back scattered electrons

c) Secondary electrons   d) Transmitted electrons

2. Answer **any five** of the following : **10**

   i) State different characteristics of ideal Op-Amp.

   ii) Define the Duty cycle of timer IC555.

   iii) What do you mean by Holding current of SCR ?

   iv) What are the different types of displays ?

   v) What is principle of optical tranducer ?

   vi) Give specific reason of higher resolution in electron microscopy.

3. A) Answer **any two** of the following : **6**

   i) How SCR can made TURN-ON by different method ?

   ii) Write short note on gas discharge plasma display.

   iii) Explain principle and working of A.C. servomotor sensor.

  B) Calculate the frequency of output waveform produced by astable multivibrator when charging resistance R_A is 10 KΩ and R_B is 10 KΩ with capacitance of 0.01 μ F. **4**

4. Answer **any two** of the following : **10**

   i) How a speed of a D.C. motor is controlled by using SCR ?

   ii) Explain principle and working of resistance temperature detector transducer.

   iii) Discuss the Op-Amp as inverting amplifier.

5. Answer **any one** of the following : **10**

   i) Draw the functional block diagram of IC-555 and explain the function each block.

   ii) Describe principle, construction and working of scanning electron microscopy.

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Seat No.	

B.Sc. – III (Semester – VI) (New) Examination, 2016
CHEMISTRY (Special Paper – XVI)
Analytical and Industrial Organic Chemistry

Day and Date : Tuesday, 29-3-2016
Time : 10.30 a.m. to 12.30 p.m.

Max. Marks : 50

N. B. : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** labelled diagrams and give equations **wherever** necessary.

1. Select the most correct alternative from those given below : **10**

    i) Synthetic detergents can be represented by general formula
        a) RONa
        b) $ROSO_3Na$
        c) RCOOH
        d) RCOONa

    ii) Polyurethanes are obtained by condensation of
        a) Diol and di-isocyanate
        b) Urea and formaldehyde
        c) Urea and di-isocyanate
        d) Diol and formaldehyde

    iii) The percentage of alcohol in completely fermented molasses (wash) is
        a) 90%
        b) 60%
        c) 40% – 50%
        d) 10% – 12%

    iv) The reactions catalysed by enzymes in living organisms are called _____ reactions.
        a) Biocatalytic
        b) Polymerisation
        c) Friedel Craft's
        d) None of these

    v) Food flavours and aromas of flowers can be analysed by _____ chromatography.
        a) Paper
        b) Column
        c) Thin layer
        d) Gas

    vi) _____ is synthetic adhesive used in sizing of man-made fibres.
        a) Polyvinyl alcohol
        b) Starch
        c) Flour
        d) Tallow

    vii) Rosins mixed with soaps impart _____ property.
        a) Antioxidant
        b) Lathering
        c) Fixative
        d) Disinfectant

P.T.O.

viii) The process of removal of adhered oil, wax from fabric by boiling it with soaps or detergents is called

    a) Sizing   b) Bleaching   c) Scouring   d) Dyeing

ix) Zeolites act as _____ in Friedel Craft's alkylation.

    a) Catalysts   b) Reactants   c) Products   d) Fillers

x) The ratio of the distance moved by the solute to that of solvent in case of a chromatogram is called

    a) Distribution coefficient   b) Rate of flow value (R_f)

    c) Adsorption coefficient   d) Capillary action

2. Answer **any five** of the following :   **10**

   i) What are homopolymers and co-polymers ?

   ii) Explain the term amphoteric detergent with one example.

   iii) Why is lime added in the clarification of sugar juice ?

   iv) Explain congealing property of a starch paste.

   v) What are microwave assisted reactions ? Give example.

   vi) Draw the labelled block diagram of a gas chromatographic apparatus.

3. A) Answer **any two** of the following :   **6**

   i) Write a brief note on vulcanisation of rubber.

   ii) Explain the role of biocatalysts in oxidation of alkyl benzenes.

   iii) Compare soaps versus detergents.

  B) Discuss the experimental technique of paper chromatography.   **4**

4. Answer **any two** of the following :   **10**

   i) With a neat labelled diagram explain the hot process of manufacture of soaps.

   ii) Discuss the extraction of cane juice with sketch of mill-house.

   iii) Write a brief note on sizing ingredients with their functions.

5. Answer **any two** of the following :   **10**

   i) Write synthesis and uses of Buna-S rubber.

   ii) Explain the principle and process of column chromatography.

   iii) Explain the chemical reactions involved in the fermentation of molasses by yeast cells. What are the by-products of alcohol industry ?

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Seat
No.

B.Sc. III (Semester – VI) Examination, 2016
BOTANY (Special Paper – XVI) (New)
Molecular Biology and Biotechnology

Day and Date : Tuesday, 29-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

N.B. : I) **All** questions are **compulsory**.
II) **All** questions carry **equal** marks.
III) Draw **neat** and labeled diagram **wherever** necessary.
IV) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences choosing the correct alternative.   **10**

   1) "Gene-Battery model" of gene regulation in eukaryotes is proposed by

      a) Jacob and Monod   b) Britten and Davidson

      c) Beadle and Tatum   d) Kornberg and Ochoa

   2) The term hybridoma implies to

      a) Gametic fusion   b) Hybrid virion

      c) Somatic hybridization   d) DNA-RNA hybrid

   3) _____ invented the Polymerase Chain Reaction (PCR).

      a) Karl B. Mullis   b) Alec Jeffreys

      c) Paul Berg   d) H.O. Smith

   4) Introduction of foreign gene for improving genotype is called

      a) Tissue culture   b) Vernalization

      c) Genetic engineering   d) Eugenics

   5) In Operon concept, regulator gene functions as

      a) Inhibitor   b) Regulator   c) Repressor   d) All of these

P.T.O.

6) _____ is not used as a vector.

   a) Plasmid   b) E. Coli   c) Cosmid   d) Bacteriophase

7) Haploid plants can be obtained by _____ culture.

   a) Short tip   b) Cell suspension

   c) Anther   d) Embryo

8) First step in genetic engineering is

   a) Isolation of RNA

   b) Isolation of Protein

   c) Isolation of genetic material

   d) Purification of protein

9) Recent technique used for separating fragment of DNA is

   a) Northern blotting   b) Southern blotting

   c) Eastern blotting   d) Western blotting

10) The diameter of Z DNA molecule is

   a) $18A^\circ$ b) $22A^\circ$ c) $45A^\circ$ d) $34A^\circ$

2. Answer **any five** of the following.   **(2×5=10)**

   1) Which genes are involved in Lac Operon ?

   2) Enlist the forms of DNA.

   3) Define micropropogation.

   4) What is vector ?

   5) Define Chimeric DNA.

   6) What is mean by renaturation of DNA ?

3. A) Answer **any two** of the following.   **(3×2=6)**

   1) Describe any one mechanism of regulation of enzyme synthesis in Lac operon.

   2) Describe southern blotting technique.

   3) Give any three sterilization methods of plant tissue culture.

  B) Write a note on Z-DNA.   **4**

4. Answer **any two** of the following. (5×2=10)

   1) Describe Polymerase Chain Reaction (PCR).

   2) Describe cDNA library.

   3) Discuss in brief mechanism of DNA replication.

5. Answer **any one** of the following. (10×1=10)

   1) Describe the method of isolation of protoplast from plant cell.

   2) Explain the gene organization in prokaryotes.

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SLR-W – 312

B.Sc. (Part – III) (Semester – VI) (New) Examination, 2016
ZOOLOGY (Special Paper – XVI)
Biotechniques and Applied Zoology

Day and Date : Tuesday, 29-3-2016   Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.
3) Draw **neat** and labeled diagrams **wherever** necessary.

1. Select appropriate answer from **each** of the following and rewrite the sentence.   **10**

   1) The very young fishes coming out of eggs are called

      a) Fingerlings   b) Fry   c) Milt   d) Younglets

   2) The optical density of given sample is measured by the device

      a) Balance   b) pH meter

      c) Colorimeter   d) Magnetic disc

   3) In the biological control of pests _____ are used.

      a) Fumigants   b) Weedicides

      c) Biological agents   d) Chemicals

   4) _____ is oldest method for fish preservation.

      a) Freezing   b) Chilling   c) Sun drying   d) Frying

   5) Chromatography can be used to

      a) form mixtures

      b) change mixture compositions

      c) separate mixtures into pure substances

      d) all of these

6) Oral case of catterpiller of Silk moth is called

a) cocoon   b) pupa   c) cyst   d) egg case

7) The full form of PAGE is

a) Polyanamide gel electrophoresis   b) Polyamide gel electrophoresis

c) Polyacrylamide Gel Electrophoresis   d) Poly analide Gel Electrophoresis

8) _____ is a good source of fish oil.

a) Catla   b) Mrigal   c) Pompret   d) Oil Sardine

9) Silk is a secretion of silkworm from its specialized

a) Salivary glands   b) Spiracles

c) Fat bodies   d) Malpigian tubules

10) The locating agent of amino acids is

a) Diazo reagent   b) Ninhydrin spray

c) Amphoteric oxides   d) Neutral oxides

2. Write short note on following (**any five**).   **10**

1) Grasshopper

2) Animal cell culture

3) Fishing crafts

4) Cryopreservation

5) pH

6) Ecdysis.

3. A) Answer **any two** of the following. **6**

    i) Economic importance of pearl

    ii) Principle and use of pH meter

    iii) Varieties of silk worms

  B) Give an account and use of centrifuge. **4**

4. Answer **any two** of the following. **10**

    i) Write about the viral diseases of the silk moth.

    ii) Describe the use of column chromatography.

    iii) Give an account and use of centrifuge.

5. Answer **any one** of the following. **10**

  A) What is fish culture ? Add an account on off shore fishery with one example.

  B) What are the agricultural pests ? Describe biological control of crop pests.

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Seat No.

B.Sc. – III (Semester VI) Examination, 2016
MATHEMATICS (Special Paper XVI) (New)
Programming in C

Day and Date : Tuesday, 29-3-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.

2) Figures to the **right** indicate **full** marks.

1. Select the correct alternative for **each** of the following   . **10**

   1) _____escape sequence makes space between two words.

      a) \t   b) \a   c) \n   d) none of these.

   2) In 'C' language constant can be declared using

      a) Constant keyword   b) #define

      c) Both a) and b)   d) None of these

   3) Integer data type requires _____ bytes of memory.

      a) 01   b) 02   c) 04   d) none of these

   4) _____ operator cannot operates on float data type.

      a) %   b) +   c) –   d) none of these

   5) _____ is standard input function in C language.

      a) printf()   b) scanf()   c) getch()   d) none of these

   6) The _____ header file contains mathematical functions.

      a) ⟨stdio.h⟩   b) ⟨mathh⟩   c) ⟨conio.h⟩   d) none of these

   7) _____ is multiway decision making statement.

      a) if   b) switch   c) goto   d) none of these

   8) ANSIC contains _____ keywords.

      a) 30   b) 32   c) 23   d) none of these

   9) _____ is exit controlled loop in C language.

      a) while   b) do-while   c) for   d) None of these

   10) One dimensional array is also called as

      a) vector   b) matrix   c) both a) and b)   d) none of these

P.T.O.

2. Attempt **any five** of the following : **10**

1) Define C-Token. List of diffrent tokens in C-language.

2) Write use of 'sizeof' operator.

3) Write syntax to use do-while loop.

4) Define forward and backward jump of goto statement.

5) Name and write their use of any two mathematical in build functions.

6) List the commonly used format codes with their meaning.

3. A) Attempt **any two** of the following : **6**

1) Explain conditional operator with example.

2) Explain switch statement with example.

3) What is keyword and identifiers.

B) Write a note on basic structures in C programs. **4**

4. Attempt **any two** of the following : **10**

i) What is array ? Explain one dimension and two dimension array.

ii) Write a C-programme to find maximum number between given three numbers.

iii) What is data type ? Explain inbuilt data types.

5. A) Attempt **any one** of the following : **10**

i) Write a program to compute the sum of first 'n' numbers.

ii) Explain relational operators and logical operators.

B) An electric power distribution company charges its domestic consumer's as follows.

Consumption units	Rate of charge
0 - 200	Re. 0.50 per unit
201 - 400	Rs. 100 + Re. 0.65 per unit
401 - 600	Rs. 230 + Re. 0.80 per unit
601 - above	Rs. 390 + Re.1.00 per unit excess of 600

Write the program to read the customer number and power consumed and prints the amount to be paid by the customer.

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Seat
No.

B.Sc. (Part – III) (Semester – VI) (New) Examination, 2016
STATISTICS (Special Paper – XVI)
C – Programming

Day and Date : Tuesday, 29-3-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions :   1) **All** questions are **compulsory**.

2) Use of **simple** or **scientific** calculator is **allowed**.

3) Figures to the **right** indicate **full** marks.

1. Select most correct alternative :   **10**

   i) C is a programming language developed at

      a) Microsoft Corp., USA   b) IBM, USA

      c) Borland International, USA   d) AT and T's Bell Laboratories of USA

   ii) In C, an arithmetic expression 5/3 + 10*1.2 results in

      a) 13.66   b) 13

      c) 13.67   d) 14

   iii) Which of the following is not a keyword in C ?

      a) double   b) int

      c) mean   d) return

   iv) Which of the following is not true while constructing an integer constant in C ?

      a) An integer constant must have at least one digit

      b) It could be either positive or negative

      c) Default sign is positive

      d) It must have a decimal point

P.T.O.

v) The assignment statement x = x – b; is equivalent to

   a) x – = b;
                    b) x = – b;

   c) b – = x;
                    d) none of these

vi) The C program execution always begin with the function

   a) scanf()
                    b) printf()

   c) main()
                    d) return()

vii) Which of the following shows the correct hierarchy of arithmetic operations in C ?

   a) $/ + * -$
                    b) $* - / +$

   c) $+ - / *$
                    d) $* / + -$

viii) If p is an integer pointer with initial value, say 3032, then after the operation p = p + 1; the value of p will be

   a) 3032
                    b) 3033

   c) 3034
                    d) none ot these

ix) What is an array ?

   a) An array is a collection of variables that are of the dissimilar data type

   b) An array is a collection of variables that are of the same data type

   c) An array is not a collection of variables that are of the same data type

   d) None of these

x) We can insert pre written code in a C program by using

   a) # read
                    b) # get

   c) # include
                d) # put

2. Answer **any five** of the following : **10**

  i) What is a keyword in C ?

  ii) State the rules for constructing integer constants.

  iii) How to declare variables in C ?

  iv) State the use of getchar() and putchar()

  v) What is the syntax of ternary operator ?

  vi) What is a pointer in C ?

3. A) Answer **any two** of the following : **6**

    i) Give the syntax of if statement.

    ii) Give the syntax of while statement.

    iii) What is an user defined function ?

   B) Write a C program for addition of two integers. **4**

4. Answer **any two** of the following : **10**

   i) Explain switch statement. Illustrate by one example.

   ii) Explain do... while loop. Illustrate by one example.

   iii) Write a note on array.

5. Answer **any one** of the following : **10**

   i) Write a C program for finding arithmetic mean and standard deviation of n values.

   ii) Explain strlwr() and strupr(). Illustrate each by one example.

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SLR-W – 315

Seat No.	

B.Sc. (Part – III) (Semester – VI) Examination, 2016
GEOLOGY (Special Paper – XVI) (New)
(Economic Geology)

Day and Date : Tuesday, 29-3-2016　　　　　　　　　Max. Marks : 50
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　2) Figures to the **right** indicate **full** marks.
　　　　　　　　3) **Draw** neat diagrams **wherever** necessary.

1. Fill in the blanks with correct answer from the given options :　　　**10**

　　1) The placer deposits along the coastal tract of Maharashtra is _____
　　　　a) Gold　　　　　b) Zircon　　　　　c) Rutile　　　　d) Ilmenite

　　2) The process responsible for the formation of placer deposits is _____ concentration.
　　　　a) Mechanical　　b) Residual　　　c) Magmatic　　d) Chemical

　　3) The placer deposits formed by the action of ocean waves are called _____ placers.
　　　　a) Fluvial　　　　b) Eluvial　　　　c) Beach　　　　d) Wave

　　4) Tenor value for precious metals is _____
　　　　a) Low　　　　　b) High　　　　　c) Moderate　　　d) Very high

　　5) Bauxite is _____ concentration deposit rich in Al.
　　　　a) Rudaceous　　b) Residual　　　c) Arenaceous　　d) Hydrothermal

　　6) Hydrothermal _____ deposits are mainly produced in carbonate rocks.
　　　　a) Replacement　b) Vein　　　　c) Cavity filling　d) Placer

　　7) Diamonds occurs as _____ magmatic deposits.
　　　　a) Dissemination　　　　　　　b) Segregation
　　　　c) Injection　　　　　　　　　d) Placer

　　8) Sulphide ores are the most common products of _____ process.
　　　　a) Fluvial　　　　　　　　　　b) Residual
　　　　c) Magmatic　　　　　　　　　d) Supergene enrichment

P.T.O.

9) Ilmenite is a common _____ placer deposit.

    a) Eluvial   b) Beach   c) Alluvial   d) Thermal

10) Major Gold resources in India is located at _____ gold fields.

    a) Jaduguda   b) Panna   c) Hutti   d) Mangalwedha

2. Answer **any five** of the following :   **10**

    1) What is late magmatic deposit ?

    2) What are Eluvial placers ?

    3) What are Residual deposit ?

    4) What are Epigenetic ore deposit ?

    5) What are Syngenetic ore deposit ?

    6) What is Crustification ?

    7) Describe Bauxite.

3. A) Answer **any two** of the following :   **6**

    1) Fissure vein deposit

    2) Formation of laterites

    3) Describe with example Gossan.

  B) Write answer of **any one** of the following :   **4**

    1) Ore deposits of Karnataka

    2) Radioactive ore deposits.

4. Answer **any two** of the following :   **10**

    1) Supergene enrichment process.

    2) What is hydrothermal replacement deposit ? Give Indian example.

    3) Describe any two essential conditions for the formation of hydrothermal deposits.

5. Answer **any two** of the following :   **10**

    1) Explain origin and distribution of Indian copper deposits.

    2) Describe Radioactive ore deposits.

    3) Describe Fissure vein deposit.

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B.Sc. – III (Semester – VI) (New) Examination, 2016
MICROBIOLOGY (Special Paper – XVI)
Medical Microbiology

Day and Date : Tuesday, 29-3-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
              2) Draw **neat** labelled diagrams **wherever** necessary.
              3) Figures to the **right** indicate **full** marks.

1. Rewrite the following sentences by selecting correct alternatives given below :   **10**

   1) Mycobacterium tuberculosis can grow on _____ medium.

     a) MacConkeys agar

     b) Blood agar

     c) Levinson Johnson (L.J.) medium

     d) All of these

   2) Helicobacter pylori forms _____ colonies on blood agar.

     a) Pale yellow   b) Red

     c) Black   d) Green

   3) Hydrophobia is the symptom of

     a) Rabies   b) Filariasis

     c) Gas gangrene   d) Hepatitis

   4) Swarming growth on agar is characteristic feature of

     a) Vibrio Cholerae

     b) Proteus Vulgaris

     c) E.Coli

     d) Pseudomonas aeruginosa

5) Plasmodium reproduces asexually in the
   a) Mosquito
   b) Human
   c) Stagnant water
   d) Both mosquito and human

6) Sulphonamides are inhibitor of _____ synthesis.
   a) Folic acid
   b) Vitamin B_{12}
   c) Protein
   d) Peptidoglycan

7) Latency in the germinal ganglia is characteristic of which of the following
   a) Hepatitis A virus
   b) Plasmodium vivax
   c) Herpes simplex virus
   d) AIDS

8) Viral population can be estimated by _____ determination.
   a) LD_{50}
   b) TCD_{50}
   c) HI units
   d) all of these

9) Clostridium perfringens is
   a) Gram positive, aerobic, spore bearing rods
   b) Gram positive, anaerobic, spore bearing rods
   c) Gram negative, aerobic, non spore bearing rods
   d) Gram negative, anaerobic, non-spore bearing rods.

10) _____ is a veneral disease.
   a) Syphilis
   b) Leprosy
   c) Gas gangrene
   d) Filariasis

2. Answer **any five** of the following : **10**

   1) Diagnosis of hospital infection.

   2) Morphological characters of <u>vibrio</u> <u>cholera</u>.

   3) Spread of Hepatitis B virus.

   4) Biological weapons.

   5) Antimicrobial drug – Define.

   6) Name drugs acting on nucleic acid.

   7) Negri bodies.

3. A) Answer **any two** of the following : **6**
   1) Pathogenicity of viruses.
   2) Mechanism of drug resistance.
   3) Life cycle of Plasmodium vivax.

   B) Write an account on AIDS. **4**

4. Answer **any two** of the following : **10**
   1) Account on Treponema Pallidum.
   2) Mode of action of chloramphenicol or streptomycin.
   3) Give details of pathogenesis of Herpes simplex.

5. Answer **any two** of the following : **10**
   1) Write an essay on swine flu.
   2) Give an account on antifungal drugs.
   3) Mycobacterium leprae.

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SLR-W – 317

B.Sc. – III (Semester – VI) Examination, 2016
ELECTRONICS (Special Paper – XVI) (New)
Measurement Instrumentation and Control System

Day and Date : Tuesday, 29-3-2016   Max. Marks : 50

Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All** questions are **compulsory**.
               2) Figures to the **right** indicate **full** marks.
               3) **Neat** diagrams are drawn **wherever** necessary.
               4) **Use** of log-table and calculator are **allowed**.

1. Select the correct alternative of the following :   **10**

    1) The action potential of typical cell is

       a) +20 mV   b) –20 mV

       c) –90 mV   d) +90 mV

    2) The basic principle used in the LCR-Q meter is to measure

       a) Current passing through component

       b) Voltage across the component

       c) Both a) and b)

       d) Voltage passing through component

    3) The proportional control system has an output proportional to the

       a) input   b) error

       c) output   d) noise

    4) The essential component of digital storage oscilloscope is

       a) sample and hold circuit   b) amplifier

       c) oscillator   d) active filters

5) The pulse oximeter is used to measure

    a) Pulse rate   b) Heart beat

    c) Oxygen level   d) All of these

6) In the analog oscilloscope _____ mode is used for low frequency measurement.

    a) alternative   b) chopp

    c) both a) and b)   d) none of these

7) The bioelectric signals are usually of _____ frequency.

    a) high   b) ultrahigh

    c) moderate   d) low

8) The PLC is used for _____ control functions.

    a) discrete   b) continuous

    c) solenoides   d) both a) and b)

9) The cell in action state is said to be

    a) polarized   b) depolarized

    c) repolarized   d) unexcited

10) A system in which control action is totally independent of the o/p of the system is called _____ system.

    a) closed loop   b) open loop

    c) automatic   d) all of these

2. Solve **any five** :   **10**

    1) Write characteristics of control system.

    2) Give the principle to measure the conductivity of liquid.

    3) Give the symbols of ladder diagram.

    4) Define resting and action potential.

    5) Explain the action of horizontal deflection in analog CRO.

    6) Explain EEG in brief.

    7) State salient features of PLC.

3. A) Solve **any two** : **6**

    1) Explain in brief PI control system.

    2) Explain the various operational modes of DSO.

    3) Discuss in brief pulse oximeter.

  B) Explain ON-OFF temperature control system. **4**

4. Solve **any two** : **10**

    1) Explain digital controller for industrial process.

    2) Explain ultrasonic imaging system and how it helps in medical applications.

    3) Explain with diagram pH meter.

5. Solve **any one** : **10**

    1) Explain servo motor control system in detail with diagram, as a case study.

    2) Explain the architecture of PLC with the help of diagram.

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Seat No.

B.Sc. – III (Semester – VI) Examination, 2016
Computer Science (Special Paper – XVI)
DATA COMMUNICATION AND NETWORKING – II (New)

Day and Date : Tuesday, 29-3-2016
Time : 10.30 a.m. to 12.30 p.m.

Max. Marks : 50

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

1. Choose the correct alternative and rewrite the answer. **10**

   1) _____ protocol in TCP/IP suite converts IP address to physical address.
      a) UDP   b) SMTP   c) HTTP   d) ARP

   2) _____ is a malicious software that attaches itself to other software and replicate.
      a) Worm   b) Virus   c) Trojan Horse   d) None

   3) _____ provides flexible and powerful packet oriented data transmission.
      a) TELNET   b) GPS   c) GPRS   d) None

   4) _____ is unreliable connection less protocol used for communication between peer entities.
      a) POP   b) HTTP   c) UDP   d) SNMP

   5) Google, Youtube, FB use _____ to secure communication between server and web browser.
      a) SMTP   b) TLS   c) UDP   d) None

   6) Pretty good privacy protocol provides security at _____ layer.
      a) application   b) presentation c) session   d) transport

   7) _____ is a device used to connect two similar networks.
      a) Gateway   b) Bridge   c) Hub   d) Brouter

P.T.O.

8) _____ are used protect companies internal network from outside network.

a) Filter   b) Protector   c) Firewall   d) None

9) _____ is a most common open source web server available for Linux.

a) Samba   b) Apache   c) Quid   d) Pine

10) Wi-Fi stands for

a) Wide Fidelity   b) Wireless Fidelity

c) Wireless Filler   d) All

2. Answer the following **any five** :   **10**

1) What is login script ?

2) Explain Flow Control.

3) What is cryptography ?

4) Explain the use of Router.

5) What is public key and private key ?

6) What is FTP ?

3. A) Answer the following **any two** :   **6**

1) Differentiate between GPS and GPRS.

2) Explain authentication mechanism.

3) List the responsibilities of Network Administrator.

B) Explain User Datagram Protocol.   **4**

4. Answer the following **any two** :   **10**

1) Explain user and group management.

2) Discuss about the elements of transport layer protocol.

3) Explain GPRS.

5. Answer the following **any two** :   **10**

1) Explain FTP server and Proxy server.

2) Discuss TCP/IP Protocol suite.

3) Explain network security techniques.

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