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**M.Sc. (Part – I) (Semester – I) (C.B.C.S.) (New) Examination, 2015**  
**GENETICS**  
**Biostatistics and Population Genetics (Paper – II)**

Day and Date : Wednesday, 18-11-2015  
Time : 10.30 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions:** 1) **All** question of Section I are **compulsory**.  
2) Answer **any four** questions from Section II.  
3) Graph paper will be provided on **request**.  
4) **Use** of non-data storage calculator is **allowed**.

SECTION – I

1. A) Rewrite the following sentences by choosing the most correct alternative given below. 7

- i) The nucleotides in the triplet may be any one of the four bases {A, C, G, T}. Then the total number of possible triplets are \_\_\_\_\_  
a) 4                      b) 8                      c) 16                      d) 64
- ii) The decision of rejecting  $H_0$  when it is true is called \_\_\_\_\_  
a) an error                      b) correct  
c) type I error                      d) type II error
- iii) To find out the mode value \_\_\_\_\_ graph is used.  
a) frequency curve                      b) histogram  
c) frequency polygon                      d) Ogive curve
- iv) \_\_\_\_\_ is a group of genetic trait which have high fitness when they occur together.  
a) Supergene                      b) Epistatic gene  
c) Co-adapted gene                      d) Genetic load



- v) Theory of natural selection was given by \_\_\_\_\_
  - a) Robert Hook
  - b) Hardy Weinberg
  - c) Fisher
  - d) Charles Darwin
- vi) \_\_\_\_\_ is defined as group of individual that actually or potentially interbreed in nature.
  - a) Species
  - b) Hybrids
  - c) Genus
  - d) Soma clones
- vii) In a broad sense, \_\_\_\_\_ refers to any character that can be used to distinguish one type of individual from another in a population.
  - a) a genetic marker
  - b) trait
  - c) alleles
  - d) both (b) and (c)

B) Define the following terms.

7

- i) Biostatistics
- ii) Primary data
- iii) Null hypothesis
- iv) Polymorphism
- v) Heritability
- vi) Genotype
- vii) Habitat.

SECTION – II

- 2. Explain the statistical methods for mapping QTL in experimental cross populations. **14**
- 3. Write an essay on isolating mechanism for speciation. **14**
- 4. Find the correlation coefficient between X and Y from the following data. **14**

<b>X</b>	7	9	13	15	19
<b>Y</b>	15	17	29	33	40

Interpret the relationship between them.



5. Answer **any two** of the following. 14

- a) Give an account on Hardy-Weinberg equation with any one suitable example.
- b) The following table represents the number of patients with different diseases from a particular hospital.

Disease	Heart disease	Renal failure	Accidents	Jaundice	Asthma	General fever
Number of Patients	4	3	7	4	10	8

Represent the above data by pie-chart.

- c) Discuss the various types of species and concept of species.

6. Write short note on **any two** of the following. 14

- a) Write a note on standard deviation. Enlist the merits and demerits of using it.
- b) Associative mapping and Genomic selection.
- c) Calculate the arithmetic mean of the following data.

Class Interval	10–20	20–30	30–40	40–50	50–60	60–70
Frequency	3	5	10	15	5	12

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**M.Sc. – I (Semester – I) (New) (CBCS) Examination, 2015**  
**GENETICS**  
**Cytogenetics and Genome Organization (Paper – III)**

Day and Date : Friday, 20-11-2015  
Time : 10.30 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :** 1) *Section I is compulsory.*  
2) *From Section II attempt any four.*  
3) **All questions carry equal marks.**  
4) *Figures to the right indicate full marks.*  
5) *Draw neat and labeled diagrams wherever necessary.*

SECTION – I

1. A) Rewrite the following sentences by using correct alternative : 7
- 1) The 30 nm diameter stage during packaging of eukaryotic DNA molecule is known as \_\_\_\_\_
    - a) Nucleosome fiber
    - b) Solenoid fiber
    - c) Chromatid
    - d) Folded domains
  - 2) Polytene chromosomes are specifically found in \_\_\_\_\_
    - a) Human being
    - b) Chironomous
    - c) Frog
    - d) House fly
  - 3) \_\_\_\_\_ is an agent of Cytoplasmic or extra-nuclear inheritance.
    - a) Mitochondria
    - b) Chloroplast
    - c) Plasmids
    - d) All of these
  - 4) Cytoplasmic or extra-nuclear inheritance in plants through plastid were first discovered by \_\_\_\_\_
    - a) Watson
    - b) Morgan
    - c) Angstrom
    - d) Carl Correns
  - 5) In \_\_\_\_\_ blood clotting is absent or taking place very slowly.
    - a) Hemophilia
    - b) Color blindness
    - c) Hypertrichosis
    - d) Night blindness

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**M.Sc. (Part – I) (Semester – I) Examination, 2015  
(New – CBCS)  
GENETICS**

**Paper No. – IV : Cellular and Molecular Biology**

Day and Date : Monday, 23-11-2015

Max. Marks : 70

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

- Note:** 1) *Section – I compulsory.*  
2) *Answer any four questions from Section – II.*

SECTION – I

1. A) Rewrite the sentence after choosing the correct answer from the given alternatives :

7

- 1) RNA polymerase III is located in  
a) Cytoplasm    b) Nucleoplasm    c) Nucleolus    d) Mitochondria
- 2) \_\_\_\_\_ is a common second messenger.  
a) cAMP    b) cGTP    c) cMHC    d) cATP
- 3) \_\_\_\_\_ receptor is a seven transmembrane reseptor.  
a) hedgehog    b) G protein  
c) patched    d) None of the above
- 4) Essential components of eukaryotic cistron are  
a) Introns    b) exons  
c) operons    d) operator of regulatory genes
- 5) Clover leaf model belongs to  
a) tRNA    b) DNA    c) Centriole    d) Flagella
- 6) \_\_\_\_\_ enzyme is called mitochondrial polymerase and is encoded in the nucleus.  
a) DNA polymerase  $\alpha$     b) DNA polymerase  $\beta$   
c) DNA polymerase  $\gamma$     d) DNA polymerase  $\delta$
- 7) G-proteins are  
a) dimeric    b) trimeric    c) tetrameric    d) pentameric

P.T.O.





- B) Define the following terms : 7
- 1) Okazaki fragments.
  - 2) RNA polymerase.
  - 3) Codon usage.
  - 4) Cadherins.
  - 5) Antiscence.
  - 6) Si RNA.
  - 7) Transcription.

### SECTION – II

2. Explain in detail Transcription of Prokaryotes with neat labeled diagram. 14
  3. Describe the process of protein synthesis in detail with neat labeled diagram. 14
  4. Discuss signal transduction. Give a detail account on Hedgehog signaling pathway. 14
  5. Answer **any two** of the following : 14
    - a) Explain in detail types of replication with neat labeled diagram.
    - b) Describe in detail structure and functions of endoplasmic reticulum and Golgi apparatus.
    - c) Genetic code and its properties.
  6. Write short notes on **any two** of the following : 14
    - a) G protein coupled receptor pathway.
    - b) Membrane trafficking.
    - c) Discuss in brief “Fluid mosaic model” with diagram.
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**M.Sc. – II (Semester – III) Examination, 2015**  
**GENETICS (CGPA)**  
**Paper – I : Immunology**

Day and Date : Monday, 16-11-2015

Marks : 70

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

- Instructions:** 1) *Section I is compulsory.*  
2) *From Section II attempt any four.*  
3) *All questions carry equal marks.*  
4) *Figures to the right indicate full marks.*  
5) *Draw neat labelled diagrams wherever necessary.*

SECTION – I

1. A) Rewrite the following sentences by using correct alternative :

7

- 1) The specificity of an antibody is due to  
A) Its heavy chain  
B) Its light chain  
C) Variable portion of heavy and light chain  
D) Its 33 hinge region
- 2) The main players of humoral immunity are  
A) B-lymphocytes  
B) T-lymphocytes  
C) Macrophages  
D) T helper cells
- 3) A living pathogen with reduced pathogenicity is known as  
A) Attenuated  
B) Toxioid  
C) Virulent  
D) Denatured

P.T.O.



- 4) In human MHC genes are located on
- A) Segment of short arm of chromosome 6
  - B) Segment of long arm of chromosome 6
  - C) Segment of short arm of chromosome 2
  - D) Segment of short arm of chromosome 22
- 5) Immunoglobulin heavy chain gene segment is composed of \_\_\_\_\_ segments of the genome.
- A) V and D
  - B) C and J
  - C) V, D and J
  - D) V, D, J and C
- 6) Perforins are produced by
- A) Cytotoxic T cells
  - B) Suppressor cells
  - C) Plasma cells
  - D) Helper T cells
- 7) The most sensitive test for antigen detection is
- A) RIA
  - B) ELISA
  - C) Immunofluorescence test
  - D) Agglutination test

B) Define the following terms :

7

- 1) Recombinant vaccine.
- 2) Inflammation.
- 3) Monoclonal antibodies.
- 4) Agglutination.
- 5) Antigen.
- 6) Autograft.
- 7) Phagocytosis.



SECTION – II

Attempt **any four** :

2. What is antigenicity ? Discuss the various factors affecting antigenicity. **14**
  3. What are MHC molecules ? Describe the structure and function of MHC I and MHC class II molecules. **14**
  4. Discuss in detail the B-cell generation, maturation and differentiation. **14**
  5. Write an essay on autoimmunity. **14**
  6. Answer **any two** of the following : **14**
    - 1) Applications of monoclonal antibodies.
    - 2) Types of transplants.
    - 3) IgM.
  7. Answer **any two** of the following : **14**
    - 1) Alternate complement activation pathway.
    - 2) Atopy.
    - 3) Recombinant vaccines.
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**M.Sc. II (Semester – III) Examination, 2015**  
**GENETICS (CGPA)**  
**Paper – II : Molecular Medicine**

Day and Date : Wednesday, 18-11-2015

Total Marks : 70

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

- Instructions :** 1) *Section I is compulsory.*  
2) *From Section II attempt any four.*  
3) *All questions carry equal marks.*  
4) *Figures to right indicate full marks.*  
5) *Draw neat and labeled diagrams.*

SECTION – I

1. A) Rewrite the following sentences by using correct alternative : 7
- 1) In Genetics term, Duchenne Muscular Dystrophy is \_\_\_\_\_ type of disease.  
a) Autosomal Dominant                      b) Autosomal Recessive  
c) X linked Dominant                      d) X linked Recessive
  - 2) Adult stem cells are \_\_\_\_\_  
a) unipotent    b) multipotent    c) pluripotent                      d) all of these
  - 3) In Cystic Fibrosis patient the mucous is dehydrated because of improper regulation of \_\_\_\_\_ ions.  
a) Chloride    b) Pottasium    c) Calcium                      d) Sodium
  - 4) \_\_\_\_\_ is a disease in which the patient has neither cell mediated immune response nor able to make antibodies.  
a) DMD                      b) SCID  
c) Thalassaemia                      d) Sickle cell anaemia
  - 5) \_\_\_\_\_ cells are the only cells which can develop into whole organism.  
a) Pluripotent                      b) Multipotent  
c) Totipotent                      d) Unipotent



- 6) In Gene therapy retrovirus vectors can only be used for \_\_\_\_\_ cells.  
a) dividing    b) non-dividing    c) stem    d) cancer
- 7) The first step in drug discovery is \_\_\_\_\_  
a) target validation    b) lead identification  
c) target identification    d) lead optimization

B) Answer the following terms :

7

- 1) DNA fingerprinting
- 2) Differentiation
- 3) Blood group antigens
- 4) Plasticity
- 5) Regenerative medicine
- 6) Gene therapy
- 7) Pharmacogenetics.

SECTION – II  
(Attempt any four)

2. Write an essay on prenatal diagnosis. 14
  3. Describe Huntington's disease. 14
  4. Explain in detail about the steps involved in drug discovery. 14
  5. Describe in detail non-viral methods of gene therapy. 14
  6. Answer **any two** of the following. 14
    - 1) Explain embryonic stem cells.
    - 2) Write a note on magic bullet cells as drug delivery system.
    - 3) Explain Human genome project.
  7. Answer **any two** of the following. 14
    - 1) Describe microarray technology.
    - 2) Describe applications of pharmacogenetics.
    - 3) Explain down syndrome.
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**M.Sc. Genetics – II (Semester – III) Examination, 2015**  
**Paper – III : ANALYTICAL INSTRUMENTS AND TECHNIQUES (CGPA)**

Day and Date : Friday, 20-11-2015  
Time : 2.30 p.m. to 5.00 p.m.

Max. Marks : 70

- Instructions :** 1) *Section – I is compulsory.*  
2) *From Section – II attempt any four.*  
3) **All questions carry equal marks.**  
4) **Figures to right indicate full marks.**  
5) **Draw neat and labeled diagrams.**

SECTION – I

1. A) Rewrite the following sentences by using correct alternative :

7

- 1) \_\_\_\_\_ is the process of enlarging something only in appearance not in physical size.  
a) Magnification                      b) Resolving power  
c) Numerical aperture                d) Focal length
- 2) A biologically insignificant radioactive isotope is \_\_\_\_\_  
a) <sup>35</sup>S              b) <sup>15</sup>O              c) <sup>15</sup>N              d) <sup>32</sup>P
- 3) Migration rate under unit potential gradient is known as \_\_\_\_\_  
a) Intensity                              b) Resistivity  
c) Mobility                                d) Absorptivity
- 4) \_\_\_\_\_ is extensively used chromatographic technique to determine base composition of nucleic acid.  
a) Adsorption                            b) Affinity  
c) Gel permeation                      d) Ion exchange
- 5) X ray diffraction can only be applied to \_\_\_\_\_  
a) Solid, Crystalline material        b) Gas  
c) Liquid                                  d) Organic solvent
- 6) \_\_\_\_\_ is a radioactive compound form.  
a) Radium                                 b) Potassium uranyl sulphate  
c) Thorium                                d) Uranium







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**M.Sc. (Part – II) (Semester – III) (C.G.P.A.) Examination, 2015**  
**GENETICS**  
**Paper – IV : Bioinformatics and Research Methodology**

Day and Date : Monday, 23-11-2015  
Time : 2.30 p.m. to 5.00 p.m.

Max. Marks : 70

- Instructions :**
- i) **All** question of Section – I are **compulsory**.
  - ii) Answer **any four** questions from Section – II.
  - iii) **All** questions carry **equal** marks.
  - iv) Draw **neat** and labeled diagrams **wherever** necessary.

SECTION – I

1. A) Rewrite the following sentences by choosing the most correct alternative given below :

7

- i) \_\_\_\_\_ composite database is the default database of NCBI BLAST.
  - a) NRDB
  - b) OWL
  - c) MIPSx
  - d) Swiss Prot +TrEMBL
- ii) Organisms are classified into \_\_\_\_\_ risk groups based on their potential effects on a healthy human adult.
  - a) two
  - b) four
  - c) six
  - d) eight
- iii) The information about translation of gene is included in \_\_\_\_\_ of GenBank flat file format.
  - a) Header part
  - b) Accession line
  - c) Feature table
  - d) Sequence line
- iv) \_\_\_\_\_ is a central element in the NCBI data model, which comprises a single, continuous molecule of either nucleic acid or protein.
  - a) SEQ-ID
  - b) BIO-SEQ
  - c) SEQ-ANNOT
  - d) SEQ-DESCR





6. Answer **any two** of the following : **14**
- a) Describe the term SEQ-ANNOT.
  - b) Write a note on plagiarism.
  - c) Explain the substitution matrices used in alignment.
7. Answer **any two** of the following : **14**
- a) Write a note on components of research.
  - b) Illustrate the methods, strategies and considerations for prediction of DNA sequences.
  - c) Describe the socio-economic and ethical consideration in research.
-