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**M.Sc. (Semester - I) (New) (NEP CBCS) Examination: March/April-2024
(MICROBIOLOGY CAMPUS)**

Microbial Diversity and Taxonomy (2316101)

Day & Date: Friday, 10-05-2024
Time: 03:00 PM To 05:30 PM

Max. Marks: 60

- Instructions:** 1) All question are compulsory.
2) Figure to right indicates full marks.
3) Draw neat labelled diagrams wherever necessary.

Q.1 A) Rewrite the sentences by selecting correct alternatives given below. 08

- 1) _____ is father of microbial evolution.

a) Pasteur	b) Lederberg
c) Tatum	d) Leeuwenhoek
- 2) Lowest taxonomic unit is _____.

a) family	b) order
c) species	d) phylum
- 3) Haeckel classified the organisms in to _____ kingdom.

a) two	b) one
c) six	d) five
- 4) DNA of Mitochondria and chloroplasts is similar to DNA of _____.

a) fungi	b) algae
c) bacteria	d) protozoa
- 5) Blue green algae belongs to _____.

a) animalia	b) prokaryotes
c) bryophytes	d) fungi
- 6) _____ is used as green manure.

a) protozoa	b) bacteria
c) yeast	d) nostoc
- 7) _____ found in extreme saline conditions.

a) Yeast	b) BGA
c) Mycoplasma	d) Halobacterium
- 8) 16SrRNA is present in _____.

a) ribosome	b) mesosome
c) carboxysome	d) glyoxysome

B) True or False. 04

- 1) Yeast is filamentous fungus.
- 2) Archaeobacteria are old living entities.
- 3) Mycorrhiza is association between fungi and algal.
- 4) Methanogens are extremophiles.

- Q.2 Answer the following. (Any Six) 12**
- a) Biosphere
 - b) Which organelles are endosymbionts & Why?
 - c) Species
 - d) Vernacular names
 - e) Acidophilus
 - f) Taxonomy
 - g) soda lakes & desert
 - h) Hyperthermophiles
- Q.3 Answer the following. (Any Three) 12**
- a) General characteristics and importance algae
 - b) Halophiles and Barophiles
 - c) Rules of Nomenclature
 - d) Significance of 16SrRNA in bacterial classification
- Q.4 Answer the following. (Any two) 12**
- a) Biochemical characteristics used in classification
 - b) Define thermophiles, Write in detail on commercial aspects of thermophiles
 - c) General properties of protozoa and outline classification of protozoa
- Q.5 Answer the following. (Any two) 12**
- a) General characteristics of Yeast and fungi
 - b) Whittaker's five kingdom classification
 - c) General characteristics of Lichen and Mycorrhiza

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**M.Sc.(Semester - I) (New) (NEP CBCS) Examination: March/April - 2024
MICROBIOLOGY (CAMPUS)
Recent Trends in Virology (2316102)**

Day & Date: Monday, 13-05-2024
Time: 03:00 PM To 05:30 PM

Max. Marks: 60

Instructions: 1) All questions are compulsory.
2) Figure to right indicate full marks.

Q.1 A) Rewrite the following sentences by selecting correct answer from given alternatives. 08

1) The protein coat of viruses that enclose the genetic material is called _____.

- | | |
|------------|-----------|
| a) Capsule | b) Capsid |
| c) Core | d) Burst |

2) _____ is a first step in replication of bacterial viruses.

- | | |
|---------------|----------------|
| a) Adsorption | b) Penetration |
| c) Lysis | d) Elongation |

3) _____ infected by Influenza virus.

- | | |
|-----------|-----------------------|
| a) Heart | b) Liver |
| c) Kidney | d) Respiratory system |

4) _____ spreads by arthropods.

- | | |
|--------------|------------|
| a) HIV | b) Corona |
| c) Arbovirus | d) Rabbits |

5) _____ drug has been used for treat COVID – 19.

- | | |
|---------------|--------------|
| a) Remdesivir | b) Acyclovir |
| c) Tamiflu | d) AZT |

6) _____ crystallized and isolated viruses firstly.

- | | |
|------------------|----------------|
| a) F. C. Bowden | b) K. M. Smith |
| c) W. M. Stanely | d) M. Harshy |

7) Small pox vaccine is _____ vaccine.

- | | |
|-----------|----------------------|
| a) Killed | b) Second generation |
| c) r DNA | d) Attenuated |

8) _____ viruses are Icosa Le draons.

- | | |
|----------------|--------------|
| a) Simple | b) Isometric |
| c) Filamentous | d) Complex |

B) Write True or False

04

- 1) Interferon is antibacterial protein.
- 2) D. Iwanowski discovered virus.
- 3) Zika virus transmitted by mosquito.
- 4) BCG is viral vaccine.

- Q.2 Answer the following (Any Six) 12**
- a) What is Lysogenic cycle?
 - b) What is full form of SARS?
 - c) What is Hemagglutination?
 - d) Define temperate phages.
 - e) Define plague.
 - f) How Nipah virus transmitted?
 - g) What are the satellite viruses?
 - h) What is prophage?
- Q.3 Answer the following. (Any Three) 12**
- a) Write on viroids and prions.
 - b) Describe cultivation of viruses by using cell culture.
 - c) Describe purification of viruses by Enzymatic and serological methods.
 - d) Describe in short one step growth curve.
- Q.4 Answer the following. (Any Two) 12**
- a) Describe in detail morphology and ultra structure of viruses.
 - b) Describe in detail Ebola virus infection.
 - c) Describe in detail Pathogenesis of Animal viruses.
- Q.5 Answer the following. (Any Two) 12**
- a) Describe in detail Lysogenic cycle of bacteriophages.
 - b) Describe in brief various assays of viruses.
 - c) Describe in detail classification and nomenclature of animal and plant viruses.

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**M.Sc. (Semester - I) (New) (NEP CBCS) Examination: March/April-2024
MICROBIOLOGY (CAMPUS)
Diagnostic Microbiology (2316107)**

Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 05:30 PM

Max. Marks: 60

Instructions: 1) All questions are compulsory.
2) Figure to right indicate full marks.

Q.1 A) Choose correct alternative.

08

- 1) In a direct fluorescent antibody test, which of the following would we most likely be looking for using a fluorescently-labeled mAb?
 - a) bacteria in a patient sample
 - b) bacteria isolated from a patient and grown on agar plates
 - c) antiserum from a patient smeared onto a glass slide
 - d) antiserum from a patient that had bound to antigen-coated beads
- 2) What is the ideal time period limit for the transportation of the specimen to the laboratory after the collection method?
 - a) 2 minutes
 - b) 30 minutes
 - c) 1 hour
 - d) 2 hours
- 3) ____ bacilli are identified on the basis of acid-fast staining.
 - a) Salmonella
 - b) E. coli
 - c) Tubercle
 - d) Neisseria
- 4) Phenyl alanine deamination test is the characteristic test for identification of genus _____.
 - a) Salmonella
 - b) Proteus
 - c) Klebsiella
 - d) Pseudomonas
- 5) Koplik spot formation is the specific symptom in ____ disease.
 - a) Streptococcus
 - b) Salmonella
 - c) Rubella
 - d) Rubeola
- 6) ____ like components added in the enriched media support the growth of fastidious organisms.
 - a) pH indicator
 - b) salt
 - c) Bile salt
 - d) Blood
- 7) Herpes simplex is seen in _____.
 - a) < 10 years of age
 - b) 12-15 years of age
 - c) 25-30 years of age
 - d) 55-60 years of age
- 8) In a BSL 2 laboratory, what type of protective clothing is typically required for laboratory personnel?
 - a) Lab coat and gloves
 - b) Lab coat, gloves and safety goggles
 - c) Lab coat, gloves, safety goggles and a face mask.
 - d) Lab coat, gloves, safety goggles and face shield

B) Write True/False. **04**

- 1) In complement fixation test hemolysis indicates positive test. **True/False**
- 2) Balantidiasis is the bacterial infection. **True/False**
- 3) PCR technique is used for diagnosis of many diseases. **True/False**
- 4) *Helicobacter pylori* produces powerful urease enzyme. **True/False**

Q.2 Answer the following. (Any Six) **12**

- a) Define biosafety cabinet.
- b) What is microbiome?
- c) Use of incineration.
- d) Causative agent of Ascariasis and its morphology.
- e) BSL -2
- f) Define amboceptor and its use.
- g) Components of Complement fixation test.
- h) Principle of autoclave.

Q.3 Answer the following. (Any Three) **12**

- a) Describe complement fixation test and its applications.
- b) Use of protective clothing.
- c) Write a note on *Helicobacter pylori* infection.
- d) Write a note on RFLP.

Q.4 Answer the following. (Any Two) **12**

- a) Pathogenesis, symptoms and lab diagnosis of infections caused by *Ascaris lumbricoides*.
- b) PCR technique and its application in diagnosis.
- c) ELISA test and Complement fixation test.

Q.5 Answer the following. (Any Two) **12**

- a) Write a note on methods collection and transport of clinical samples.
- b) Pathogenesis, symptoms and lab diagnosis of infections caused by Rubella virus.
- c) Serological methods for diagnosis of diseases with example.

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**M.Sc. (Semester - I) (New) (NEP CBCS) Examination: March/April-2024
MICROBIOLOGY (CAMPUS)
Research Methodology (2316103)**

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 05:30 PM

Max. Marks: 60

Instructions: 1) All Questions are compulsory.
2) Figure to right indicate full marks.

Q.1 A) Choose correct alternative.

08

- 1) A research design should provide detailed information about _____.
a) the study population b) data collection methods
c) ethical issues d) All of the above
- 2) The first chapter of the report should be entitled _____.
a) results b) introduction
c) conclusion d) methodology
- 3) What is a cross-sectional design?
a) A study of one particular section of society, e.g. the middle classes
b) One that is devised when the researcher is in a bad mood
c) The collection of data from more than one case at one moment in time
d) A comparison of two or more variables over a long period of time
- 4) "Controlled Group" is a term used in _____.
a) Survey research b) Historical research
c) Experimental research d) Descriptive research
- 5) An abstract of the journal article doesn't contain _____.
a) methodologies b) Result
c) Objectives d) Ethical consideration
- 6) Source of data collected and compiled by others is called _____.
a) Primary b) Secondary
c) Primary & Secondary d) None of these
- 7) Which is the correct order of well-organized research paper?
a) references-result—method—introduction—discussion
b) references-result - introduction—discussion—method
c) introduction—method—result—discussion- references
d) method—result—discussion—references-. Introduction
- 8) In an experiment, the one variable that is changed is called the _____.
a) Independent variable b) Controlled variable
c) Dependent variable d) Experimental variable

B) Write True /False.

04

- 1) Applied research is used to find solutions to everyday problems.
- 2) For a successful research we need a research design.
- 3) The objective of quantitative research is not to develop and employ mathematical models, theories and/or hypotheses pertaining to phenomena.
- 4) Tentative answer to your research question is hypothesis.

- Q.2 Answer the following. (Any Six) 12**
- a) Define research.
 - b) What do you mean by basic research?
 - c) What are the advantages and disadvantages of correlational research?
 - d) What is the difference between citation and reference?
 - e) What is variable and which are the types of variables?
 - f) What should be written in acknowledgement section of research paper?
 - g) Write any four characteristics of good hypothesis.
 - h) What is Inductive method of research?
- Q.3 Answer the following. (Any Three) 12**
- a) Write a note on “Motivation of research”.
 - b) Write a note on “steps of research design”.
 - c) Write a note on “oral presentation”.
 - d) Write a note on “plagiarism”.
- Q.4 Answer the following. (Any Two) 12**
- a) Discuss on “Questionnaire as tool of data collection”.
 - b) Discuss on “result” section of research paper.
 - c) Write in detail about “historical research”.
- Q.5 Answer the following. (Any Two) 12**
- a) Discuss in detail about “hypothesis”.
 - b) Write an essay on “Types of reports”.
 - c) Write an essay on “Types of data”.

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M.Sc. (Semester - II) (New) (NEP CBCS) Examination: March/April-2024
MICROBIOLOGY (CAMPUS)
Pharmaceutical Microbiology (2316201)

Day & Date: Thursday, 09-05-2024
 Time: 11:00 AM To 01:30 PM

Max. Marks: 60

Instructions: 1) All questions are compulsory.
 2) Figure to right indicate full marks.

Q.1 A) Rewrite the following sentences by selecting correct answer from given alternatives. 08

- 1) _____ radiation uses longer wavelength and lower energy for sterilization.
 - a) Non ionizing
 - b) X ray
 - c) Gamma
 - d) Ionizing
- 2) _____ inhibits nucleic acid synthesis.
 - a) Norfloxacin
 - b) Chloramphenicol
 - c) Penicillin
 - d) Ampicillin
- 3) The 50s ribosomal subunit is target for _____ antibiotics.
 - a) Macrolide
 - b) Chloramphenicol
 - c) Bactericidal
 - d) Antifungal
- 4) _____ concerned with change in temperature required to kill specific number of microbes.
 - a) L value
 - b) D value
 - c) B value
 - d) Z value
- 5) Who published the Indian pharmacopeia?
 - a) Food and Drug Administration
 - b) FSSAI
 - c) Ministry of defence
 - d) Indian Pharmacopeia Commission
- 6) A lipid bilayer structure that encloses an internal aqueous volume.
 - a) Liposome
 - b) Solid lipid nanoparticle
 - c) Nanoparticle
 - d) Noisome
- 7) An advantage of Novel Drug Delivery Systems is _____.
 - a) it causes fluctuation of blood levels
 - b) it cannot be target specific
 - c) it increases toxicity of the drug
 - d) it reduces side effects of the drug
- 8) Who controls the essential drug price in India?
 - a) BIS (Bureau of Indian Standard)
 - b) FSSAI (Food Safety and Standards Authority of India)
 - c) BEL (Bharat Electronics Limited)
 - d) NPPA (National Pharmaceutical Pricing Authority)

B) Fill in the blanks or write true or false **04**

- 1) USP in pharmaceutical stands for _____.
- 2) Penicillin acts inhibits synthesis of _____.
- 3) The biological indicator in sterilization is _____.
- 4) The full form of FSSAI is _____.

Q.2 Answer the following (Any Six) **12**

- a) What are the advantages of synthetic peptide vaccine?
- b) What is the purpose of validation of pharmaceutical products?
- c) Give the long forms of ISO and ISI.
- d) Write the use of liposomes in pharmaceuticals.
- e) What are antifungal agents?
- f) Which biological indicators are used to test sterilization?
- g) Give the examples chemical disinfectants and preservatives.
- h) What do you mean by gene therapy?

Q.3 Answer the following. **12**

- a) Write the role of advanced technology in R and D in pharmaceuticals.
- b) Write differences between quality assurance and quality control.
- c) Write a note on characteristics of antibacterial agents.

Q.4 Answer the following. (Any Two) **12**

- a) Write a note on DNA vaccines.
- b) Discuss in detail about biosensors.
- c) Describe in brief about drug delivery system in gene therapy.

Q.5 Answer the following. (Any Two) **12**

- a) Discuss in detail about sterilization control and sterility testing in pharmaceutical industry.
- b) Discuss in detail about biosafety cabinets in microbiology laboratory.
- c) Describe in detail about antibiotics affecting cell wall synthesis.

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M.Sc. (Semester - II) (New) (NEP CBCS) Examination: March/April-2024
MICROBIOLOGY (CAMPUS)
Microbial Biochemistry (2316202)

Day & Date: Saturday, 11-05-2024
 Time: 11:00 AM To 01:30 PM

Max. Marks: 60

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

Q.1 A) Rewrite the sentences by selecting correct alternatives given below. 08

- 1) _____ is nonprotein chemical substance or metallic ion that is required for enzyme activation.
 - a) Cofactor
 - b) Cosubstrate
 - c) Coworker
 - d) Copartner
- 2) Enzymes that are involved in the feed back inhibition are known as _____ enzyme.
 - a) Apo
 - b) Co
 - c) Holo
 - d) Allosteric
- 3) Cobalamin is another name of vitamin _____.
 - a) K
 - b) A
 - c) B12
 - d) C
- 4) Fischer proposed _____ hypothesis of enzyme action.
 - a) Induced fit
 - b) Lock and key
 - c) Clonal selection
 - d) Allosteric
- 5) _____ are the substances reduces the rate of enzyme catalyzed reactions.
 - a) Substrates
 - b) Inhibitors
 - c) Enzymes
 - d) Products
- 6) Enzymes are chemically made up of _____.
 - a) Carbohydrates
 - b) Lipids
 - c) Polysaccharides
 - d) Proteins
- 7) _____ is an example of acidic amino acid.
 - a) Glutamic acid
 - b) Arginine
 - c) Lysine
 - d) Histidine
- 8) Cholesterol is an example of _____.
 - a) Glycolipid
 - b) Lipoprotein
 - c) Phospholipid
 - d) Carbolipid

B) Write True or False.

04

- 1) Steroides are injurious to human health.
- 2) Starch is polymer of glucose.
- 3) Chymotrypsin is saccharolytic enzyme.
- 4) Leghemoglobin is found in human blood

- Q.2 Answer the following (Any six) 12**
- a) Give the example of Aromatic amino acid.
 - b) Give the examples of water soluble vitamins.
 - c) What is active site of enzyme?
 - d) Give the significance of V_{max} .
 - e) Define coenzyme.
 - f) What is function of Isomerase.
 - g) Define Beta oxidation.
 - h) What is function of peroxidase enzyme.
- Q.3 Write short notes. (Any three) 12**
- a) Ramchadram plot
 - b) Bacterial pigments
 - c) Irreversible inhibition
 - d) Cofactors
- Q.4 Answer the following (Any two) 12**
- a) Describe in detail kinetics of Multisubstrate reactions.
 - b) Give the types and structures of lipids.
 - c) Describe in detail oxidation of aromatic hydrocarbons.
- Q.5 Answer the following (Any two) 12**
- a) Write an essay on Osmosis.
 - b) Give in detail Enzyme catalytic mechanisms.
 - c) Describe in detail Nomenclature and structure or carbohydrates.

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M.Sc. (Semester - II) (New) (NEP CBCS) Examination: March/April-2024
MICROBIOLOGY (CAMPUS)
Bioinformatics and Biostatistics (2316207)

Day & Date: Tuesday, 14-05-2024
 Time: 11:00 AM To 01:30 PM

Max. Marks: 60

Instructions: 1) All Questions are compulsory.
 2) Figure to right indicate full marks.

Q.1 A) Rewrite the sentences choosing correct alternative.**08**

- 1) Which of the following is the first biological database?
 - a) Genbank
 - b) DDBJ
 - c) Atlas of protein sequence and Structure
 - d) OMIM
- 2) The most frequently occurring value in the data set is called _____.
 - a) Spread
 - b) Mode
 - c) Skewness
 - d) Median
- 3) CLUSTAL W is used for _____ alignment.
 - a) Pairwise
 - b) Multiple
 - c) Pairwise and Multiple
 - d) Local
- 4) Sequence _____ reflects the evolutionary relationship between sequences.
 - a) Homology
 - b) Similarity
 - c) Identity
 - d) All of these
- 5) The number of occurrences of a data value is called _____.
 - a) the class limits
 - b) the frequency
 - c) the cumulative frequency
 - d) the relative frequency
- 6) The PubMed provides information of _____ database.
 - a) Nucleotide
 - b) Protein
 - c) Genome
 - d) Literature
- 7) Which of the following is a protein structure database?
 - a) Genbank
 - b) Swiss-Prot
 - c) DDBJ
 - d) PDB
- 8) A measure of the strength of the linear relationship that exists between two variables is called _____.
 - a) Slope
 - b) Intercept
 - c) Correlation coefficient
 - d) Regression equation

B) Fill in the blanks OR Write true/false.**04**

- 1) An instructor recorded the following quiz scores (out of a possible 10 points) for the 12 students present: 7, 4, 4, 7, 2, 9, 10, 6, 7, 3, 8, 5. The mode for this set of scores is _____.
- 2) The average of a series of numerical values is the sum of the values divided by their number. (True/False)
- 3) List any two protein databases.
- 4) The middle value of an ordered array of numbers is the Median. (True/False)

Q.2 Answer the following. (Any Six)**12**

- a) Define Phylogeny.
- b) Give the merits and demerits of primary data.
- c) Define genomics with suitable example.
- d) Continuous Variable and Continuous Data.
- e) Enlist the primary databases for protein and nucleic acid.
- f) What are the different methods of sampling?
- g) Calculate the median for given data:
8, 12, 7, 5, 6, 10, 14, 16, 13, 12, 11, 7, 9, 15, 13, 10, 13, 9, 6, 8, 9
- h) What are the sources for secondary data.

Q.3 Answer the following. (Any Three)**12**

- a) Explain the interpretation and properties of Karl's Pearson coefficient of correlation.
- b) What is measures central tendency? What are the good characteristics of measures of central tendency?
- c) Search engines used in bioinformatic.
- d) RASMOL.

Q.4 Answer the following. (Any Two)**12**

- a) Enlist the nucleic acid databases and write the information on GenBank.
- b) Write a note of diagrammatic representation of data.
- c) What is homology? Describe tools needed to determine homology.

Q.5 Answer the following. (Any Two)**12**

- a) What is microarray? Give its type and applications.
- b) Give in detail the Prediction of the 3D structure of proteins and its applications.
- c) Discuss the methods for construction of histogram, frequency curve, ogive curve.

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M.Sc. (Semester - II) (New) (NEP CBCS) Examination: March/April-2024
MICROBIOLOGY (CAMPUS)
Physiology and Metabolism (2316208)

Day & Date: Tuesday, 14-05-2024
 Time: 11:00 AM To 01:30 PM

Max. Marks: 60

- Instructions:** 1) All Questions are compulsory.
 2) Figure to right indicate full marks.
 3) Draw neat-labeled diagrams wherever necessary.

Q.1 A) Choose the correct alternative and rewrite the sentences again. 08

- 1) Sodium ions are usually more concentrated _____ of the cell and potassium ions are usually more concentrated _____ of the cell.
 - a) Inside, Outside
 - b) Outside, Outside
 - c) Outside, Inside
 - d) Inside, Inside
- 2) _____ method does not require any carrier or channel for transport of substances.
 - a) Active transport
 - b) Facilitated diffusion
 - c) Group translocation
 - d) Simple diffusion
- 3) _____ Complex is also known as cytochrome c oxidase.
 - a) Complex-IV
 - b) Complex-III
 - c) Complex-II
 - d) Complex-I
- 4) _____ is a uncoupler which inhibit the ATP synthesis and generates heat in electron transport chain.
 - a) ATP synthase
 - b) Thermogenin
 - c) Cyanide
 - d) Cytochrome b
- 5) In salvage pathway thymidylate synthase enzyme is required for the synthesis of _____.
 - a) Cytosine
 - b) Uracil
 - c) Thymine
 - d) Adenine
- 6) In fatty acid synthesis _____ carrier molecule is responsible for moving acetyl and malonyl units between active site of enzyme.
 - a) Carnitine
 - b) Acyl carrier Protein
 - c) Coenzyme A
 - d) Glycerol phosphate
- 7) Microbes uses _____ pathway for the oxidation of aromatic hydrocarbons.
 - a) Glycolysis
 - b) Kreb
 - c) Beta ketoacidate
 - d) Pentose phosphate pathway
- 8) _____ pathway is used to synthesize the aromatic amino acids.
 - a) Shikimate
 - b) TCA
 - c) HMP
 - d) EMP

B) Write True or False of following. 04

- 1) Carrier proteins are involved in both passive and active transport.
- 2) The electron transport chain involves the pumping of protons across the mitochondrial inner membrane.
- 3) The Krebs cycle occurs in the cytoplasm of eukaryotic cells.
- 4) Glycolysis is an alternative to the beta-ketoadipate pathway for the oxidation of aromatic hydrocarbons.

Q.2 Write short notes on any six of the following. 12

- a) What is a symport?
- b) Define osmosis.
- c) Why the sodium-potassium transport mechanism is called a pump?
- d) Name the enzymes and the coenzymes involved in of PDH complex.
- e) What is the role of Cytochromes in ETC.
- f) What is Oxidative stress and its effects?
- g) Free radicals.
- h) What is passive transport?

Q.3 Answer the following. 12

- a) Discuss in detail Synthesis of Purine nucleotides from IMP.
- b) Describe in brief group translocation.
- c) Describe in detail mechanism of microbial drug detoxification.

Q.4 Answer the following. (Any Two) 12

- a) Describe in detail synthesis of amino acid from serine family.
- b) Discuss in brief components of mitochondrial electron transport chain.
- c) Discuss in brief degradation of aromatic hydrocarbons by β ketoadipate pathway.

Q.5 Answer the following. (Any Two) 12

- a) Describe in detail Kreb cycle and add a note on its energetics.
- b) Describe in detail Salvage pathways for Purine and Pyrimidine synthesis.
- c) Give an account on microbial hormones and add a note on its significance.

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M.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2024
MICROBIOLOGY (CAMPUS)
Molecular Biology and Genetic Engineering (MSC01201)

Day & Date: Thursday, 09-05-2024
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No.3 to Q. No.7
 3) Figures to the right indicates full marks.

Q.1 A) Choose the correct alternatives from the given options. 10

- 1) Which technique is used to detect COVID-19?
 - a) RT-PCR
 - b) RAPD
 - c) AFLP
 - d) RFLP
- 2) How proteins move from Endoplasmic reticulum to Golgi complex?
 - a) By globules
 - b) By vacuoles
 - c) By lysosomes
 - d) By transport vesicles
- 3) Which technique is used to detect specific RNA sequence?
 - a) Eastern Blotting
 - b) Western Blotting
 - c) Southern Blotting
 - d) Northern Blotting
- 4) Which cells are used to isolate DNA for Human genome project?
 - a) Heart cells
 - b) Blood cells
 - c) Epithelial cells
 - d) Lung cells
- 5) Which type of restriction endonuclease is mostly used in genetic engineering experiments?
 - a) Type I
 - b) Type II
 - c) Type III
 - d) Type IV
- 6) What is longform of Ti plasmid?
 - a) Tumor including plasmid
 - b) Tumor infecting plasmid
 - c) Tumor inducing plasmid
 - d) Tumor inserting plasmid
- 7) What is the function of 'signal sequences' in protein?
 - a) To activate the protein
 - b) To fold the protein in specific structure
 - c) To degrade the protein at specific sequence
 - d) To transport protein at specific destination in cell
- 8) Which type of ends are generated by the treatment of restriction endonuclease EcoRI?
 - a) Random ends
 - b) Sharp ends
 - c) Blunt ends
 - d) Cohesive ends
- 9) How will you carry out the blunt end ligation?
 - a) by using Polynucleotide kinase
 - b) by using Alkaline phosphatase
 - c) by using *E. coli* DNA ligase
 - d) by using T4 DNA ligase

- 10) In which network, metabolite of each node contributes to final product?
- a) Branched
 - b) Non-Branched
 - c) Dependent
 - d) Independent

B) Write True or False.**06**

- 1) Calcium chloride is used for chemical transformation of DNA into host cells.
- 2) Sodium nitrate is used for protoplast fusion.
- 3) Gene gun is used to deliver DNA into bacterial cells.
- 4) Lac Y gene of plasmid is used for blue-white screening.
- 5) N-terminal sequencing is also called as Edman sequencing.
- 6) Proteins are identified by Northern blotting.

Q.2 Answer the following.**16**

- a) Write a short note on *E.coli* DNA ligase.
- b) Write a short note on pBR322.
- c) Write a short note on Western blotting technique.
- d) Write a short note on RFLP.

Q.3 Answer the following.

a) Write in detail about Cell cycle.

10

b) Write a note on southern blotting technique.

06**Q.4 Answer the following.**

a) Explain in brief about PCR.

10

b) Write a note on Insertion vectors, replacement vectors.

06**Q.5 Answer the following.**

a) Write in brief about cDNA libraries.

10

b) Write a note on DNA finger printing for forensic.

06**Q.6 Answer the following.**

a) Write in brief about Restriction endonucleases.

10

b) Write a short note on synthesis of low molecular weight compounds by Metabolic pathway analysis.

06**Q.7 Answer the following.**

a) Write in brief about metabolic engineering in practice.

10

b) Applications of Genetic engineering in health sector.

06

Seat
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M.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2024
MICROBIOLOGY (CAMPUS)
Immunology and Immuno Technology (MSC01202)

Day & Date: Saturday, 11-05-2024
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. No. 1 and 2 are compulsory.
 2) Attempt any three questions from Q.No.3 to Q.No.7.
 3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative.**10**

- 1) Which of the following cells is involved in cell-mediated immunity?
 - a) T-cells
 - b) B-cells
 - c) Mast cells
 - d) Both T and B cells
- 2) Human illnesses resulting in the body attacking its own tissues are called _____.
 - a) Antibody diseases
 - b) Infectious diseases
 - c) Autoimmune diseases
 - d) Allergic diseases
- 3) Substances that are injected containing an antigen to stimulate the immune system to respond are called _____.
 - a) Vaccines
 - b) Immunoglobulins
 - c) Medications
 - d) Mast cells
- 4) What is the name of MHC in humans?
 - a) HLA
 - b) H2
 - c) Adjuvants
 - d) Haplotype
- 5) Rheumatoid arthritis is an _____ disease that affects the _____.
 - a) Allergic/cartilage
 - b) Autoimmune/nerves
 - c) Autoimmune/joints
 - d) Immunodeficiency/muscles
- 6) ELISA (enzyme-linked immunosorbent assay) allows for rapid screening and quantification of the presence of _____ in a sample.
 - a) amino acid
 - b) DNA
 - c) antigen
 - d) RNA
- 7) Cytokines _____.
 - a) are lymphokines
 - b) are monokines
 - c) help to control and regulate immune response
 - d) All of these
- 8) Contact dermatitis and allergy of infection are an example of _____ hypersensitive reaction.
 - a) Type I
 - b) Type – II
 - c) Type – III
 - d) Type – IV
- 9) _____ is a secondary lymphoid organ.
 - a) MALT
 - b) Lymph node
 - c) Spleen
 - d) All of these

- 10) Which of the following immunity is present from our birth?
a) Innate Immunity b) Active immunity
c) Passive immunity d) Acquired immunity

B) Fill in the blanks.**06**

- 1) Atopy is an example of type IV hypersensitive reaction.
a) True b) False
- 2) All the individual of the same species has the same allele of MHC genes.
a) True b) False
- 3) The MHC is a collection of genes located on chromosome No.6 in humans.
a) True b) False
- 4) Innate immunity is also called as inborn immunity.
a) True b) False
- 5) Abbreviation of ELISA is Enzyme Linked Inductive Assay.
a) True b) False
- 6) The classical complement pathway typically requires antigen-antibody complexes for activation.
a) True b) False

Q.2 Answer the following.**16**

- a) Write a note on Sandwich ELISA.
- b) Write a note on Innate immunity.
- c) Explain the terms MHC Class I and MHC Class II molecules.
- d) Write a note on primary lymphoid organs.

Q.3 Answer the following.

- a) Define the term hypersensitivity and explain its type. **10**
- b) Write a short note on alternate pathway of complement system. **06**

Q.4 Answer the following.

- a) What is autoimmunity. Explain its mechanism with two examples. **10**
- b) Write a note on B cell receptor. **06**

Q.5 Answer the following.

- a) Define vaccines. Enlist different types of vaccines and focus on recombinant vaccines. **10**
- b) Write a short note exogenous pathway. **06**

Q.6 Answer the following.

- a) Write on Cells of immune system w.r.t Structure, types and function. **10**
- b) Write a note on general properties of cytokines. **06**

Q.7 Answer the following.

- a) Write a note on principle method and applications of ELISA. **10**
- b) Write a note on antigen presenting cells. **06**

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**M.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2024
MICROBIOLOGY (CAMPUS)**

Medical Microbiology - I (Bacteriology and Parasitology) (MSC01206)

Day & Date: Tuesday, 14-05-2024
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative.

10

- 1) Test to differentiate *Staphylococci* from *Micrococi* is _____.
 - a) Catalase test
 - b) Coagulase
 - c) Novobiocin sensitivity
 - d) Oxidation fermentation
- 2) The pus producing skin infections (pyoderma) can be caused by _____.
 - a) Staphylococci
 - b) Streptococci
 - c) Corynebacteria
 - d) A combination of staphylococci, streptococci and corynebacterial
- 3) Which of the following is true about the *Streptococcus* species classification, choose correct sequence in case of *Streptococcus* species are classified?
 - a) Oxygen requirement, Hemolysis and Lancefield grouping
 - b) Lancefield grouping, Oxygen requirement and Hemolysis
 - c) Serological testing, Oxygen requirement, Hemolysis
 - d) Oxygen requirement, Hemolysis and Catalase testing
- 4) Which of the following diseases is not transmitted by vector mosquito?
 - a) Malaria
 - b) Dengue
 - c) Elephantiasis
 - d) Typhoid
- 5) *Bacillus anthracis* is the causative agent of an important zoonotic disease called as _____.
 - a) Food poisoning
 - b) Anthrax
 - c) Impetigo
 - d) Gangrene
- 6) *Cryptosporidium parvum* parasite was infect to definite host or intermediate host. Choose correct definitive host?
 - a) Goats
 - b) Human
 - c) Dog
 - d) Kittens
- 7) If the patient was suffer from a parasitic infection, then which of the following serological test is used for diagnosis?
 - a) Indirect Hemagglutination Assay
 - b) Indirect Fluorescence Assay
 - c) ELISA
 - d) All of the above

Q.6 Answer the following.

- a) Explain in detail about Morphology, symptoms, life cycle, lab diagnosis and treatment of *Giardia lamblia*. **10**
- b) Write a short note on Fluorescent microscopy. **06**

Q.7 Answer the following.

- a) Explain in brief about identification of bacteria by using following methods like gram staining, different types of media, biochemical test. **10**
- b) Write a short note on symptoms and laboratory diagnosis of Malaria. **06**

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M.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (CAMPUS)
Pharmaceutical Microbiology (MSC01301)

Day & Date: Friday, 10-05-2024
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q.Nos.1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7
 3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. 10

- 1) What is the role of research executive microbiologist in pharmaceutical industries?
 - a) To check the quality of the product
 - b) To discover the new product
 - c) To manufacture the product
 - d) To assure quality of the product
- 2) Which radiation is used for sterilization of disposable medical devices in pharma industries?
 - a) Alpha radiation
 - b) Beta radiation
 - c) Gamma radiation
 - d) Delta radiation
- 3) Which sterile pharmaceutical product is used for the long-term feeding of patients who are unconscious or unable to take food?
 - a) Saline
 - b) Tablets
 - c) Injections
 - d) Total parenteral nutrition
- 4) Why lean labs are used in pharma industry?
 - a) To test employee's skill
 - b) To test employee's knowledge
 - c) To conduct mock trial
 - d) To train new employees
- 5) What is the mechanism of action of Chloramphenicol?
 - a) It inhibits the transcription in bacteria
 - b) It inhibits the DNA replication in bacteria
 - c) It inhibits the cell wall synthesis in bacteria
 - d) It inhibits the protein synthesis in bacteria
- 6) Who is responsible for routine quality check of water used for manufacturing of pharma products?
 - a) Research and Development Microbiologist
 - b) Quality assurance executive Microbiologist
 - c) Quality control executive Microbiologist
 - d) Production Microbiologist
- 7) How much CFU allowed for purified water in pharmaceutical industry?
 - a) 1 CFU/100 ml
 - b) 10 CFU/100 ml
 - c) 100 CFU/100 ml
 - d) 1000 CFU/100 ml
- 8) Which bacteria is used to test membrane filter during in process bioburden determination of aseptically filled pharma product?
 - a) *Bacillus subtilis*
 - b) *Serratia marcescens*
 - c) *E.coli*
 - d) *Salmonella typhi*

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M.Sc. (Semester - III) (New) (CBCS) Examination: March/April - 2024
MICROBIOLOGY (CAMPUS)
Biostatistics and Bioinformatics (MSC01302)

Day & Date: Monday, 13-05-2024
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. No. 1 & 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.
 3) Figures to the right indicate full marks.

Q.1 A) Choose correct option.

10

- 1) As both the ligand and the protein are flexible, a “_____” analogy is more appropriate than “lock-and-key”.
 - a) glove-in-hand
 - b) hand-in-glove
 - c) glove-in-glove
 - d) hand-in-hand
- 2) _____ is an online bioinformatics resource operated by the SIB Swiss Institute of Bioinformatics.
 - a) Expasy
 - b) Equinox
 - c) Equity
 - d) Equi join
- 3) _____ varieties are used for multiple sequence alignment, phylogenetic tree construction, and as input for protein structure prediction.
 - a) Expasy
 - b) Equinox
 - c) Clustal
 - d) All of these
- 4) Protein structures are more conserved than protein sequences amongst homologues, but sequences falling below a 20% sequence identity can have very _____ structure.
 - a) different
 - b) same
 - c) similar
 - d) all of above
- 5) _____ are libraries of biological sciences, collected from scientific experiments, published literature.
 - a) Google
 - b) Biological databases
 - c) Yahoo
 - d) All
- 6) Structures available in the _____ include RNA and DNA oligonucleotides.
 - a) PDB
 - b) NDB
 - c) GeneBank
 - d) All
- 7) _____ is simply the average of the given set of values.
 - a) Ratio
 - b) Summation
 - c) Mean
 - d) Attribute
- 8) _____ in statistics refers to the likelihood or chance of an event occurring.
 - a) Standard deviation
 - b) Probability
 - c) Presumption
 - d) All

Q.6 Answer the following questions.

- a) Solve the problem. **10**
In a cross between black and white coat color mice, individuals obtained in F₂ generation are 787 black and 277 white coat color individuals. The expected ratio is 3:1, apply the chi-square test and comment whether data is accepted or not (P = 5%).
- b) Write a note on graphical presentation of data. **06**

Q.7 Answer the following questions.

- a) Describe in detail protein information with reference to ExPASy. **10**
- b) Write a note on Chi-square test. **06**

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**M.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (CAMPUS)**

Medical Microbiology - II (MSC01306) (Viral and Fungal Diseases)

Day & Date: Wednesday, 15-05-2024
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. 10

- 1) Aflatoxin is produced by _____.
 - a) *Aspergillus flavus*
 - b) Histoplasma
 - c) Candida
 - d) Yeast
- 2) From where coronavirus got its name?
 - a) Due to their crown-like projections
 - b) Due to their leaf-like projections
 - c) Due to their surface structure of bricks
 - d) None of the above
- 3) How is the dengue virus transmitted?
 - a) By person-to-person physical contact, such as hugging
 - b) By touching animals, often pets that are infected with the virus
 - c) Through tiny droplets expelled when an infected person coughs or sneezes
 - d) Via mosquitoes that carry the virus and bite people
- 4) What forms the genome of a virus?
 - a) DNA
 - b) RNA
 - c) Either DNA or RNA
 - d) Both DNA and RNA
- 5) Which of the following organ does influenza virus infects?
 - a) Heart
 - b) Liver
 - c) Respiratory system
 - d) Kidney
- 6) All of the following are RNA viruses except _____.
 - a) Human Adenoviruses
 - b) Hepatitis A virus
 - c) Enterovirus
 - d) Coxsackie virus
- 7) HBV is a _____ virus.
 - a) RNA
 - b) DNA
 - c) Hybrid
 - d) mRNA
- 8) Which of the following diseases does not spread by fomite transmission?
 - a) AIDS
 - b) Common cold
 - c) Ringworm
 - d) Influenza
- 9) A type of cell culture that can reproduce for an extended number of generations and is used to support viral replication is a _____.
 - a) Continuous cell line
 - b) Cell strain
 - c) Diploid fibroblast cell
 - d) Primary cell culture

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M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (CAMPUS)
Research Methodology (MSC01401)

Day & Date: Thursday, 09-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No.3 to Q. No.7
 3) Figures to the right indicates full marks.

Q.1 A) Choose the correct alternatives from the given options. 10

- 1) To which person research may mean the outlet for new ideas and insights?
 - a) To Philosopher and thinkers
 - b) To Professional
 - c) To literary men and women
 - d) To analysts and intellectuals
- 2) Which is included in research methodology?
 - a) Survey for research
 - b) Techniques used to conduct research
 - c) General methods used to conduct research in all fields
 - d) Data collection for research
- 3) Which study gives the student the necessary training in gathering material and participation in the field work for research?
 - a) Research methodology
 - b) Research training
 - c) Research methods
 - d) Research thinking
- 4) The term "research methodology" refers to _____.
 - a) The methods used in data collection and analysis.
 - b) The rules for writing a research report or paper.
 - c) The specific methods of study and analysis.
 - d) The theoretical paradigms for data collection, analysis and interpretation.
- 5) In order to pursue the research, which of the following is priorly required?
 - a) Developing a research design
 - b) Formulating a research question
 - c) Deciding about the data analysis procedure
 - d) Formulating a research hypothesis
- 6) Which of the following does not correspond to characteristics of research?
 - a) Research is not passive
 - b) Research is systematic
 - c) Research is not a problem-oriented
 - d) Research is not a process
- 7) Which is a measure usefulness of a particular journal for a given year?
 - a) Citation index
 - b) Impact factor
 - c) H-index
 - d) i10-Index

- 8) How can we enhance the research objective?
 a) By making it more valid
 b) By making it more reliable
 c) By making it more impartial
 d) All of the above
- 9) What is the objective of research?
 a) To test theory
 b) To test a hypothesis
 c) To test law
 d) To test concept
- 10) Which research aims at finding a solution?
 a) Analytical research
 b) Descriptive research
 c) Fundamental research
 d) Applied research

B) Write true or false.**06**

- 1) Journal refuses to publish articles from author who found in scientific misconducts.
- 2) Preliminary Pages are the last part of the research layout.
- 3) Summary is not a part of main text of the research layout.
- 4) Plagiarism of the data is one of the scientific misconducts.
- 5) SALAMI is one of the scientific misconducts.
- 6) IMALAS is not included in scientific misconducts.

Q.2 Answer the following.**16**

- a) Write a short note on meaning and objective of research.
- b) Write a short note on Qualitative vs. Quantitative research and Conceptual Vs. Empirical research.
- c) Write a short note on design decisions and parts of the research design.
- d) Write a note on plagiarism.

Q.3 Answer the following.

- a) Write in brief about important concepts relating to research design.
- b) Explain briefly types of research.

10**06****Q.4 Answer the following.**

- a) Explain in brief about first 5 steps of research process.
- b) Write a note on criteria of good research.

10**06****Q.5 Answer the following.**

- a) Write in brief about different types of principal bibliographic databases.
- b) Write a note on personal reference databases.

10**06****Q.6 Answer the following.**

- a) Write in brief about why scientific misconduct occurs and SALAMI, IMALAS and duplicate publication.
- b) Write a note on popular research report and oral presentation.

10**06****Q.7 Answer the following.**

- a) Write in brief about layout of the research report.
- b) Write a note investigation and punishment of scientific misconduct.

10**06**

Seat
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M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Campus)
Biosafety and Lab Management (MSC01402)

Day & Date: Saturday, 11-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 1 and 2 are compulsory.
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.
 3) Figure to right indicate full marks.

Q.1 A) Choose the correct alternatives from given option. 10

- 1) What is the hazard that you may found in the lab.
 - a) Chemicals
 - b) Infectious bacteria
 - c) Physical hazard such as falling from the wet floor
 - d) All the listed above
- 2) All of these are the step you will do in the time of chemical or bacterial sample spill on the table except.
 - a) Use the spill kits to stop the spill from spreading to other area.
 - b) Clean using dry towel and spray it with 70% ethanol for disinfectant.
 - c) Let the spill spread and drop into the floor and flooding the area
 - d) Alert the lab instructor/technician about the spill.
- 3) Where can you find safety signage in labs?
 - a) On the wall
 - b) Material Safety Data Sheet (MSDS)
 - c) OSH and laboratory SOP folder
 - d) All the above
- 4) Which of the following practices are not allowed in the laboratory?

a) Eating and Drinking	b) Applying Cosmetics
c) Handling Contact Lenses	d) All of the above
- 5) Type of packing mandatory for transportation of COVID -19 is?

a) Single layer	b) Triple layer
c) Double layer	d) None of above
- 6) Step by step written instruction to each procedure perform in the laboratory is called?

a) Quality	b) SOPs
c) Reference material	d) All of the above
- 7) Steps of proper waste management?
 - a) Waste minimization and segregation
 - b) Waste transportation
 - c) Waste collection
 - d) All of above

- 8) When working with infectious biological material, the best place to perform the work would be _____.
 a) In a Biological Safety Cabinet
 b) On the laboratory bench
 c) On a clean bench, wearing a dust mask
 d) In a Fume Hood
- 9) For research that requires Biosafety Level 2 containment, Biological Safety Cabinets must be certified by the investigator _____.
 a) Daily
 b) Monthly
 c) Annually
 d) Never, it's not important
- 10) Biological indicator used for the QC of the autoclave?
 a) *Bacillus anthracis*
 b) *Bacillus subtilis*
 c) *Geobacillus stearothermophilus*
 d) All of above

B) Write true/false**06**

- 1) The process by which all living cells, spores, and acellular entities are either destroyed or removed from an object or habitat is called disinfectant.
 a) True
 b) False
- 2) It is okay to wear sandals in the lab as long as you also wear socks,
 a) True
 b) False
- 3) PPE is Public Protective Equipment.
 a) True
 b) False
- 4) A laboratory working with human cell lines must display the biohazard symbol on areas where the work is performed or materials are stored.
 a) True
 b) False
- 5) Hands should be washed before and after working in a biological safety cabinet.
 a) True
 b) False
- 6) SARS-CoV-2 would be handled in Risk Group 1.
 a) True
 b) False

Q.2 Answer the following**16**

- a) Define biosafety and mention its levels.
 b) Write a note on facility design heightened control measures.
 c) Write a note on Transfer of specimen within a building.
 d) Write a note on Assigned roles and responsibilities of officer and committee.

Q.3 Answer the following.

- a) Explain in brief about general rules regarding chemical incompatibilities. **10**
 b) Write a note on any three of Inventory, Physical security, Transport, Personnel control. **06**

Q.4 Answer the following.

- a) Write a note on biosecurity risk assessment. **10**
 b) Write a note on Protection activities of ionizing radiation related to time, distance and shielding. **06**

Q.5 Answer the following.

- a) Write a note on Good microbiological practice and procedure. **10**
- b) Write a note on Training programme. **06**

Q.6 Answer the following.

- a) Write a note on off-site transport of infectious substances. **10**
- b) Write a note on general rules of chemical incompatibilities regarding to Toxic effects of chemicals, Explosive chemicals and chemical spills. **06**

Q.7 Answer the following.

- a) Explain in brief about specimen receipt and storage. **10**
- b) Write a note on WHO laboratory biosafety guideline related to COVID-19. **06**