Seat No.	

Set P

M.Sc. (Microbiology Campus) (Sem - I) (New) (NEP CBCS) Examination: March/April - 2025
Microbial Diversity and Taxonomy (2316101)

Day & Date: Thursday, 15-May-2025 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

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

Q.1 A) Choose correct alternative. (MCQ) **08**

1) Which microbial group is responsible for the production of oxygen during the Great Oxygenation Event?
a) Archaea b) Cyanobacteria
c) Fungi d) Viruses

2) Which gene is most frequently used in molecular techniques to define species in prokaryotes?
a) 18S rRNA gene b) ATP synthase gene
c) 16S rRNA gene d) Cytochrome c oxidase gene

3) According to the binomial nomenclature system, the correct format for writing the scientific name of an organism is _____.
a) Genus species (First letter of Genus capital all others small and all letters of species small with italicized or underlined)
b) Species Genus (capitalized)
c) Genus species (both in capital letters)
d) Species genus (italicized)

4) Which of the following Archaebacteria thrives in highly salty environments?
a) Methanogens b) Thermoacidophiles
c) Halophiles d) Psychrophiles

5) The symbiotic association between fungi and plant roots is known as :
a) Mycorrhiza b) Lichen
c) Rhizobium d) Nitrogen fixation

6) Protozoa are mainly classified based on their:
a) Mode of reproduction b) Type of pigments
c) Mode of locomotion d) Habitat

7) Mutations are important for evolution because they:
a) Always cause negative effects on an organism.
b) Provide new genetic variation for natural selection to act upon.
c) Prevent gene flow between populations.
d) Result in the extinction of species.

8) Physiological characteristics refer to an organism's:
a) Structural complexity
b) Genetic composition
c) Functional activities such as nutrient utilization and growth conditions
d) Molecular composition

B) Fill in the blanks. **04**

1) _____ tree is constructed based on molecular data and evolutionary relationships.
2) In microbial taxonomy _____ is the highest rank in the hierarchical classification system.
3) _____ is the primary method used to determine the sequence of nucleotides in an organism's genome.
4) _____ manual is used for identification of bacteria based on observable traits such as morphology, staining, and biochemical tests.

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

a) Write on Origin of cellular life.
b) Explain concept of 'species' in eukaryotes and prokaryotes.
c) What are nomenclature rules for naming microorganisms?
d) Describe hyperthermophilic habitats of thermophilic archaebacteria.
e) Write any four distinguishing characteristics of fungi.
f) Write on microbial evolution.
g) What is Haeckel's three-kingdom classification?
h) Give classification and importance of methanogens.

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

a) Describe on theoretical aspects of evolutionary analysis.
b) Give differences in the concept of 'species' in eukaryotes and prokaryotes.
c) Write on genetic and molecular characteristics used in taxonomy.
d) Give general characteristics and importance of algae.

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

a) Explain microbial phylogenetic methods.
b) What is Whittaker's five-kingdom approach for classifying living world?
c) What are alkaliphiles? Write on their classification, alkaline environment and soda lakes.

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

a) Explain Numerical Taxonomy and Chemotaxonomy.

b) Write on commercial aspects of thermophiles and applications of thermozymes.

c) Describe Lichens and Mycorrhiza.

Seat No.	

Set **P**

M.Sc. (Microbiology Campus) (Sem - I) (New) (NEP CBCS) Examination: March/April - 2025
Recent Trends in Virology (2316102)

Day & Date: Saturday, 17-May-2025 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

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

Q.1 A) Choose correct alternative. (MCQ) **08**

1) _____ is the name of the system used for classifying viruses.
a) Linnaean system
b) Baltimore classification
c) International Committee on Taxonomy of Viruses (ICTV)
d) Universal virus classification system

2) _____ of the following is a characteristic of viroids.
a) They have a lipid envelope
b) They have a protein coat
c) They are single-stranded RNA molecules
d) They are double-stranded DNA molecules

3) _____ is the result of the lytic life cycle.
a) The host cell is transformed
b) The host cell is lysed and new viral particles are released
c) The viral genome is integrated into the host genome
d) The host cell is not affected

4) _____ of the following is a limitation of viral infectivity assays.
a) They are highly sensitive
b) They are highly specific
c) They require a large amount of sample
d) They can be time-consuming and labor-intensive

5) _____ does Chikungunya primarily spread.
a) Through mosquito bites *(Aedes aegypti* and *Aedes albopictus)*
b) Through contaminated food and water
c) Through person-to-person contact
d) Through airborne transmission

6) _____ is the primary function of interferons.
a) To stimulate antibody production
b) To activate immune cells
c) To inhibit viral replication
d) To promote cell growth

7) _____ of the following viruses is an example of a virus that undergoes the lysogenic cycle.
a) Bacteriophage λ (Lambda)
b) Bacteriophage T4
c) Herpes simplex virus
d) Influenza virus

8) _____ of the following is a symptom of TMV infection in plants.
a) Yellowing of leaves
b) Stunted growth
c) Mottling or mosaic pattern on leaves
d) All of the above

B) Write true/false. **04**

1) The ICTV classifies viruses based solely on their genetic sequence.
2) The capsomeres are the individual units that make up the capsid.
3) NPV is an enveloped virus.
4) Nipah virus can cause respiratory symptoms.

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

a) Who is credited with the discovery of the first virus, Tobacco Mosaic Virus (TMV)?
b) What is the primary composition of prions?
c) What is the role of helicase in DNA virus replication?
d) What is the name of the viral genome that is integrated into the host cell's genome during the lysogenic cycle, which can remain dormant for many generations?
e) What is the importance of maintaining strict asepsis in viral cultivation?
f) What is the name of the technique used to amplify specific viral genetic sequences, allowing for the detection and identification of viruses?
g) What is the term for a vaccine that contains a weakened or attenuated form of a virus, which stimulates an immune response without causing disease?
h) What is the primary mode of transmission of Zika virus?

Q.3 Write short notes on the following. (Any three) **12**

a) Coronavirus.
b) Pathogenesis of viroid and prions.
c) Assay of viruses.
d) Lytic life cycle of viruses.

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

a) Write an essay on classification and nomenclature of animal and plant viruses.

b) Explain in detail lysogenic cycle of bacteriophages.

c) Describe in detail purification of viruses.

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

a) Write an essay on pathogenesis of animal viruses.

b) Describe in detail SARS.

c) Explain in detail morphology and ultra-structure of viruses.

SLR-ZZ-3

Seat No.	

Set P

M.Sc. (Microbiology Campus) (Sem - I) (New) (NEP CBCS) Examination: March/April - 2025
Diagnostic Microbiology (2316107)

Day & Date: Monday, 19-May-2025 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

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

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

1) What is the correct standard method used by a microbiologist for the storage of specimens such as urine, stool and swabs?
a) Storage at frozen -80 degree Celsius
b) Storage at refrigerator at 4 Degree Celsius
c) Storage at room temperature at 25 Degree Celsius
d) None of the above

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) Which of the following is the correct volume size of blood specimen taken from the adult patient for the routine laboratory diagnosis of the infection and the identification of the possible pathogen?
a) 1 ml b) 10 ml
c) 20 ml d) 0.5 ml

4) Select the incorrect procedure when performing the routine collection of microbial specimens _____.
a) A specimen should be collected in a sterile container
b) A specimen should be properly labeled with the patient's name, date, and time of collection
c) A specimen should be collected by using a sterile cotton swab or collection needles
d) A specimen should be collected only after the start of antibiotic therapy

5) Select all the important laboratory techniques and methods used for the identification of different microorganisms _____.
a) Microscopic methods b) Culture methods
c) Serological methods d) all of the above

6) _____ bacilli are identified on the basis of acid fast staining.
a) Salmonella b) E.coli
c) Tubercle d) Neisseria

7) Phenyl alanine deamination test is the characteristic test for identification of genus _____.
a) *Salmonella* b) *Proteus*
c) *Klebsiella* d) *Pseudomonas*

8) 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

B) Answer the following. **04**

1) PCR technique is not used for diagnosis of diseases. True/False
2) Pipet tips and microcentrifuge tubes can be stored in the biological safety cabinet. True/False
3) In direct immunofluorescence test, primary antibody is used. True/False
4) Every laboratory is required to have both a first aid kit and a spill kit. True/False

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

a) *Balantidium coli*
b) Causative agent of measles and its characters
c) Importance of 16s rRNA
d) Incineration and its importance
e) Define human microbiome.
f) Enlist diagnostic instruments.
g) BSL -2
h) Principle of autoclave

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

a) Note on Leptospirosis.
b) Probiotic therapy
c) Describe complement fixation test and its applications.
d) Use of protective clothing

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

a) Describe the pathogenesis and laboratory diagnosis of Herpes simplex virus infection.
b) Serological methods for diagnosis of diseases with example.
c) Write on collection of samples from oral cavity, skin and blood.

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

a) Describe good laboratory practices.
b) Pathogenesis and lab diagnosis of infections caused by *Ascaris lumbricoides.*
c) rRNA technique in diagnosis of diseases.

Seat No.	

Set P

M.Sc. (Microbiology Campus) (Sem - I) (New) (NEP CBCS) Examination: March/April - 2025
Techniques in Microbiology - I (2316108)

Day & Date: Monday, 19-May-2025 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

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

Q.1 A) Rewrite the following sentence by selecting correct answer from given alterative. 08

1) In ORD spectroscopy _____ light is used.
a) Plane polarized b) Infrared
c) Ultra violet d) Na-vapor

2) The cathode of TEM consists of a _____.
a) Bulb b) Iron filament
c) Tungsten wire d) Aluminum filament

3) Biomolecules sensitive for heat are separated by _____ centrifuge.
a) Low speed b) Cooling
c) Hand d) Filtered

4) _____ is used as fluorescent dye in electrophoresis.
a) Safranin b) Methylene blue
c) Crystal violet d) Ethidium bromide

5) _____is based on Beer-Lambert's law.
a) Centrifuge b) Microscope
c) Electrophoresis d) Colorimeter

6) _____ Centrifuge is used for sedimentation of RBC.
a) Low speed b) Cooling
c) Ultra d) Density gradient

7) Solid state nanopores are generally made in _____compound membrane.
a) Gold b) Iron
c) Silicon d) Zinc

8) In _____ atoms can absorb light as a specific, unique wavelength.
a) Colorimeter b) AAS
c) p^H meter d) Electrophoresis

B) Give True or False. **04**

1) HEPA filters are used in Laminar Air flow.
2) Electrum microscope is used for study of living bacteria.
3) Gieger muller counter is used for study of radiations.
4) Safranin is used as locating agent in paper chromatography.

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

a) What are uses of biosafety cabinet?
b) Give the principle of p^H meter.
c) Define optical density.
d) Who inverted centrifuge?
e) Define Biomimetics.
f) What is use of IR spectroscopy?
g) What is principle of Centrifuge?
h) What are the applications of Autoradiography?

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

a) Describe in brief Laminar air flow.
b) Describe in brief TLC.
c) Give the principle and applications of photoactivation localization Microscopy.
d) Describe different types of Nanoparticles.

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

a) Describe in brief Electrophoresis.
b) Give the principle, working and applications of Spectrophotometer.
c) Describe in detail Nanoparticles synthesis and characterization.

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

a) Describe in brief principle, working and applications of AAS.
b) Give the principle, working and applications of Centrifuge.
c) Describe in detail Electron Microscope.

Seat No.	

Set **P**

M.Sc. (Microbiology Campus) (Sem - I) (New) (NEP CBCS) Examination: March/April - 2025
Research Methodology (2316103)

Day & Date: Saturday, 24-May-2025 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

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

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

1) _____ is presenting someone else's work or ideas as your own, with or without their consent, by incorporating it into your work without full acknowledgement.
a) Acknowledgement b) Plagiarism
c) Introduction d) All of the above

2) _____ of the following is NOT a part of IMRAD format.
a) Introduction b) Discussion
c) Abstract d) Results

3) 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

4) What is a research design?
a) A plan for data analysis
b) A method for data collection
c) A statistical technique
d) A framework for conducting research

5) Questionnaire is a _____.
a) Research method b) Measurement technique
c) Tool for data collection d) Data analysis technique

6) While writing materials and methods of research paper _____ tense must be used.
a) Present b) Future
c) Past d) Continuous present

7) In a 'Reference' cited in research article 'et al' means _____.
a) Second author b) co-author
c) corresponding author d) First author

8) Tables and figures are used in research paper to present and explain research _____.

a) results b) materials
c) literature d) references

B) Answer the following. **04**

1) Long form of IMRAD.
2) The first chapter of the report should be entitled _____.
3) Medline, maintained by the US National Library of Medicine (NLM), is the largest and most widely used bibliographic database in the medical and biological sciences. True/False
4) Impact factor (IF) is a measure of the citation frequency of the average article in a particular journal for a given year. True/False

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

a) Define research.
b) Define secondary data.
c) Explain Data Analysis.
d) Enlist different types of reports in research.
e) Explain utility of research.
f) Write any four characteristics of good research.
g) Explain Hypothesis.
h) Define search engine.

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

a) Write a note on “oral presentation”.
b) Explain research design.
c) Explain how to write abstract of research paper.
d) Write a short note on objective and motivation of research.

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

a) Define primary data. Describe various methods of primary data collection.
b) Write an essay on, how to prepare poster?
c) Discuss on “Material and Methods” section of research paper.

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

a) Write in brief about different steps in writing research report.
b) Write a note on need for research design and features of a good design.
c) Discuss on “Questionnaire as a tool of data collection”.

Seat No.	

Set P

M.Sc. (Microbiology) (Campus) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Pharmaceutical Microbiology (2316201)

Day & Date: Wednesday, 14-May-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

Q.1 A) Rewrite the sentence by choosing correct alternatives from the following. **08**

1) The biological indicator in sterilization is _____.
a) Bacillus subtilus
b) Bacillus thermophilus
c) Geobacillus stearothermophilus
d) Geobacillus aquaticus

2) _____ inhibits DNA gyrase.
a) Penicillin b) Chloramphenicol
c) Cefoxitin d) Tobramycin

3) The commonly used gas for sterilization process is _____.
a) Nitrogen b) Methane
c) Hydrogen sulphide d) ethylene oxide

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) _____ use attenuated form of the germ that causes a disease.
a) DNA vaccines b) Killed vaccines
c) Live vaccines d) RNA vaccines

6) _____ is the example of broad spectrum antibiotics.
a) Ampicillin b) Azithromycin
c) Erythromycin d) Vancomycin

7) _____ is not the example of antiseptic agent.
a) Chlorine
b) Quaternary ammonium compounds
c) Acetic acid
d) Alcohols

8) The role of _____ is to protect the integrity and quality of manufactured product intended for human use.
a) Good laboratory practices
b) Good human practices
c) Good record practices
d) Good manufacturing process

B) Fill in the blanks. **04**

1) The full form of FSSAI is_____.
2) _____ published the Indian pharmacopeia.
3) Streptomycin inhibits _____ synthesis.
4) _____ controls the essential drug price in India.

Q.2 Answer the following questions. (Any six) **12**

a) Define subunit vaccine.
b) Give the long forms of ISO and ISI.
c) What is D and Z value mean?
d) Which biological indicators are used to test sterilization?
e) What is difference between antiseptic agent and preservatives?
f) What do you mean by gene therapy?
g) Give two examples of bacteriostatic antibiotics.
h) Give the example of chemical disinfectants.

Q.3 Answer the following questions. (Any three) **12**

a) Write a note on characteristics of antibacterial agents.
b) Write about design and layout of sterile product manufacturing of unit.
c) Reasons for limited clinical research in India.
d) Write a note on validation of pharmaceuticals products.

Q.4 Answer the following questions. (Any two) **12**

a) Discuss in detail about applications of microbial enzymes in pharmaceuticals.
b) Describe in detail about antibiotics affecting protein synthesis.
c) Discuss in detail about biosafety cabinets in microbiology laboratory.

Q.5 Answer the following questions. (Any two) **12**

a) Discuss in detail about biosensors.
b) Discuss in detail about bacterial resistance of antibiotics.
c) Describe in brief about drug delivery system in gene therapy.

SLR-ZZ-7

Seat No.	

Set P

M.Sc. (Microbiology Campus) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Microbial Biochemistry (2316202)

Day & Date: Friday, 16-May-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

Q.1 A) Choose correct alternative. **08**

1) Lineweaver Burk plot is a _____ representation of enzyme kinetics.
a) Descriptive b) Numerical
c) Graphical d) Narrative

2) Kinetic models to explain enzyme catalyzed reactions was proposed in 1913 by _____.
a) Michaelis & Menten b) Khune & Khosland
c) Hanes & Edie Hofsetee d) Hanes & Khosland

3) _____ is substrate specific enzyme.
a) Hexokinase b) Lactase
c) Decarboxylase d) Oxidase

4) The enzymes involved in feedback inhibition are called _____ enzymes.
a) Co b) Apo
c) Holo d) Allosteric

5) Reverse osmosis is also known as _____.
a) Hyperfiltration b) Hyper osmosis
c) Double filtration d) Ultrafiltration

6) The bond between two amino acids is called _____ bond.
a) Ionic b) Peptide
c) Glycosidic d) Double

7) _____ is also known as cobalamin.
a) Vitamin K b) Vitamin C
c) Vitamin B_{12} d) Vitamin A

8) Lock and key theory of enzyme action was given by _____.
a) Khosland b) Kuhne
c) Hanes d) Fischer

B) Give True or False. **04**

1) Multiple forms of same enzyme known as isoenzymes.
2) Hemoglobin is nonconjugated protein.
3) Acetyl CoA is precursor for fatty acid synthesis.
4) The term enzyme was coined by Khosland.

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

a) What is chemical nature of enzyme?
b) Which is substrate for amylase?
c) Give the example of water-soluble vitamin.
d) What is function of cytochromes?
e) Define osmosis.
f) Define active site of enzyme.
g) What is prosthetic group?
h) Define metalloenzymes.

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

a) Write short note on Amino acids.
b) Give the basic concept of enzyme inhibition.
c) Write note on Drug metabolism.
d) Give the microbial hormone and their significance.

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

a) Describe in detail structure of protein.
b) Explain in detail Michaelis-Menten equation.
c) Give in detail Enzyme catalytic mechanisms.

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

a) Describe in detail Allosteric enzymes.
b) Describe in detail Carbohydrate.
c) Describe in detail oxidation of Aromatic hydrocarbons.

Seat No.	

Set **P**

M.Sc. (Microbiology campus) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Bioinformatics and biostatistics (2316207)

Day & Date: Tuesday, 20-May-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

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

1) _____ of the following is a nucleotide sequence data base.
a) EMBL b) SWISS PROT
c) PROSITE d) TREMBL

2) Proteomics is a study of _____.
a) nucleic acid
b) structure of proteins
c) the structure and function of proteins
d) all of the above

3) Which of the following is a sequence alignment tool provided by NCBI _____.
a) Chime b) BLAST
c) FASTA d) Clustal W

4) The process of finding the relative location of genes on a chromosome is called _____.
a) Gene tracking b) Genome walking
c) Genome mapping d) Chromosome walking

5) The middle value of an ordered array of numbers is the _____.
a) Mean b) Median
c) Mode d) Midpoint

6) Two sequences are said to be homologous if they are originated from _____.
a) Common ancestor b) Different ancestor
c) Different races d) Different species

7) Arranging values in columns is called _____.
a) Matrix b) Graph
c) Cell d) Tabulation

8) SWISS-PROT represents _____ database.

a) Nucleic acid sequence b) Protein sequence
c) Genome sequence d) Cancer chromosome

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

1) Mean is not a measure of central tendency. True/False
2) BLAST is a sequence alignment tool provided by NCBI. True/False
3) Long form of DDBJ is _____.
4) Swiss-Prot is nucleotide sequence database. True/False

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

a) What are the sources for secondary data.
b) What is proteomics?
c) Give the steps in hypothesis testing.
d) Calculate the mode for given data:
8, 12, 7, 5, 6, 10, 14, 12, 13, 12, 11, 7, 9, 15, 13, 10, 12, 9, 6, 8, 12, 10
e) Give an Application of DNA microarray.
f) What is standard error?
g) Enlist the nucleic acid databases.
h) Distinguish between primary data and secondary data.

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

a) What are the functions of classification of data?
b) Search engines used in bioinformatic.
c) Write a note on regression line.
d) Protein Microarray.

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

a) What is the Secondary databases? Give a brief account of each.
b) Explain the concept of protein Microarray.
c) What is normal distribution? Explain its characters.

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

a) Write a note of diagrammatic representation of data.
b) What are the methods of phylogenetic tree construction? Give a theoretic explanation of each method.
c) What is NCBI? Elaborate resources provided by NCBI.

Seat No.	

Set **P**

M.Sc. (Microbiology campus) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Physiology and metabolism (2316208)

Day & Date: Tuesday, 20-May-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

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

1) Active transport takes place against _____. .
a) Concentration gradient and requires ATP
b) With Concentration gradient and requires ATP
c) Concentration gradient and does not requires ATP
d) All of the above

2) All types of membrane transport processes requires the use of specific proteins that allow for movement of molecules across the plasma membrane except _____.
a) Facilitated transport b) Active transport
c) Simple transport c) Group translocation

3) In oxidative phosphorylation ATP synthesis by ATP synthase is driven by the movement of _____.
a) Proton b) Electron
c) NADH d) FAD

4) The final electron acceptor in electron transport chain is_____.
a) $NADH_2$ b) Oxygen
c) $FADH_2$ d) Cytochrome b

5) _____ is the precursor starting amino acid required for the de novo purine biosynthesis.
a) Lysine b) Aspartate
c) Glycine d) Aspargine

6) _____ is the precursor for fatty acid biosynthesis.
a) Acetyl CoA b) Acto-acetyl CoA
c) Succinyl CoA d) Butyryl CoA

7) _____ is the end product of the valerate pathway.
a) Pyruvate b) Acetyl CoA
c) Succinyl CoA d) Oxaloacetate

8) _____ enzyme is responsible for breaking own superoxide radicals.

a) Catalase b) Peroxidase
c) Superoxide dismutase d) Laccase

B) Fill in the blank in following sentences. **04**

1) _____ uses the valerate pathway for the oxidation of aromatic hydrocarbons.
2) _____ enzyme is responsible for the initial step of the beta-ketoadipate pathway.
3) In the first committed step of pyrimidine biosynthesis, the reaction is catalyzed by _____.
4) _____ enzyme is responsible for breaking down hydrogen peroxide into water and oxygen.

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

a) What is osmotic stress in bacteria?
b) What is active transport?
c) What is anapleurotic reaction?
d) Structure of Mitochondria.
e) Give a role of peroxidase and catalase.
f) Enlist uncoupler and inhibitors of ETC.
g) What is the significance of microbial hormones?
h) What is reverse osmosis?

Q.3 Answer any three of the following. **12**

a) Explain in detail mechanism of theories required for ATP synthesis.
b) Discuss in brief degradation of aromatic hydrocarbons by p ketoadipate pathway.
c) Describe in detail different permeation system in *E. coli.*
d) Describe in brief group translocation.

Q.4 Answer any two of the following. **12**

a) Explain in brief citric acid cycle.
b) Write a detailed account on group translocation and facilitated diffusion.
c) Describe in detail saturated fatty acid biosynthesis.

Q.5 Answer any two of the following. **12**

a) Describe in detail Denovo biosynthesis of purines.
b) What is oxidative Phosphorylation? Describe in brief electron transport chain.
c) Describe in detail drug metabolism and detoxification.

Seat No.	

Set **P**

M.Sc. (Microbiology Campus) (Sem - III) (New) (NEP CBCS)
Examination: March/April - 2025
Principles of Bioinstrumentation and Techniques (2316301)

Day & Date: Thursday, 15-May-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

Q.1 A) Choose correct alternative. (MCQ) **08**

1) _____ is the shape of the titration curve for a strong acid and strong base titration.
a) S-shaped
b) Sigmoidal with a steep slope at equivalence point
c) Linear throughout the process
d) Parabolic

2) The role of SDS (Sodium Dodecyl Sulfate) in SDS-PAGE is to _____.
a) Provide a buffer system
b) Maintain pH
c) Denature proteins and give them a uniform negative charge
d) Stain proteins

3) _____ techniques use both isoelectric focusing and SDS-PAGE to separate proteins.
a) 1D gel electrophoresis b) Immunoelectrophoresis
c) 2D gel electrophoresis d) Disc electrophoresis

4) Moving boundary electrophoresis primarily refers to the separation of _____.
a) Proteins based on their molecular weight
b) Charged particles in a free solution
c) DNA fragments in a gel
d) Lipids based on their solubility

5) _____ is an application of affinity chromatography.
a) Separating proteins based on size
b) Isolating proteins that bind to specific ligands
c) Separating ions based on charge
d) Isolating DNA fragments based on length

6) Density gradient centrifugation separates particles based on _____.
   a) Differences in charge
   b) Differences in their buoyant density
   c) Molecular weight
   d) Hydrophobicity

7) In mass spectrometry (MS), ions are separated based on their _____.
   a) Absorption of light
   b) Emission of electromagnetic radiation
   c) Mass-to-charge ratio
   d) Fluorescence properties

8) Phase contrast microscopy is particularly useful for _____.
   a) Viewing fluorescently labelled specimens
   b) Observing transparent, unstained specimens
   c) Imaging thick biological tissues
   d) Enhancing the colour contrast of stained samples

B) Fill in the blanks. **04**

1) _____ is the separation of charged molecules, like proteins or peptides, based on their isoelectric point sunder the influence of an electric field.
2) _____ microscope is ideal for observing internal structures at the molecular level.
3) _____ microscope is a type of optical microscope that enhances the contrast of unstained, transparent specimens by illuminating them with light
4) _____ equation is used to calculate the pH of a buffer solution.

Q.2 Answer the following question (Any six) **12**

a) What is titration curve? Give its significance.
b) What is-Agarose? Give its significance.
c) What is isopycnic centrifugation? Give its applications.
d) What is numerical aperture? Give its significance.
e) What are the types of objectives?
f) Applications of X-ray diffraction.
g) Significance of cellulose acetate in electrophoresis.
h) Principle of IR spectroscopy.

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

a) Explain in detail immunoelectrophoresis.
b) Describe principle working and applications of ion exchange chromatography.
c) Write on fluorescence microscope in detail.
d) Describe principle, working and applications of MALDI-TOF.

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

a) Discuss in detail transmission electron microscope.
b) Describe principle working and applications of NMR spectroscopy.
c) Write in detail on ultracentrifugation.

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

a) Take detailed account of SDS- PAGE.
b) Describe in detail high-performance liquid chromatography.
c) Discuss features, sample preparation and advantages of Scanning electron microscope.

Seat No.	

Set **P**

M.Sc. (Microbiology Campus) (Sem - III) (New) (NEP CBCS) Examination: March/April - 2025
Bioprocess Technology (2316302)

Day & Date: Saturday, 17-May-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

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

1) The collection data from different sources using computers during fermentation is called _____.
a) data screening b) data acquisition
c) data modification d) data identification

2) The Second category of patents are assigned to _____.
a) public b) industry
c) federal government d) central government

3) Usually, Cobalt is added with _____ as precursor during Vit. B_{12} fermentation.
a) 2-10 ppm b) 20- 100 ppm
c) corn oil d) iron compound

4) The brandy comes from Dutch word 'Brandwign' that means _____.
a) Branded wine b) Branched alcohol
c) Burnt wine d) Burgundy

5) _____ Fermentor vessel have been used to produce monoclonal antibodies from Hybridoma cells.
a) Airlift b) Tower
c) Deepjet d) Waldhof type

6) Xanthan gum in printing and dying industries is used as a thickners as it shows _____.
a) High viscosity at lower concentration
b) Low viscosity at higher concentration
c) Constant viscosity at constant concentration
d) Low viscosity at low concentration

7) Oyster mushroom has crop cycle of _____.
a) 45-60 days b) 12-20 days
c) 18-40 days d) 40-50 days

8) In fermentation economics _____ is directly associated with cost of fermentation product.

a) Labour cost b) purity of product
c) Capital expenditure d) Production cost

B) Write true/false. **04**

1) In case of Gibberellins production Rollin and Thom medium is used for surface and submerged culture techniques.
2) Large scale fermenter are used in groups of 2 to 3 to allow great flexibility in research for development of fermentation process.
3) Once genetically modified organisms are produced, they should be patented.
4) Endotoxin testing should be conducted according to standard operating procedures (SOPs) in all laboratories.

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

a) What is process validation?
b) What is meant by carcinogenicity testing?
c) How are mushrooms preserved?
d) Write any two parameters of pyrogen testing.
e) What is fermentation media optimization?
f) What are biosensors and give its one application?
g) Write any two patent regulatory bodies.
h) What is sodium alginate and where is it applied?

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

a) Types of Fermentation media.
b) Product recovery cost.
c) L-Lysine fermentation.
d) GM Foods.

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

a) Describe in detail about Intellectual Property Rights.
b) Describe in detail about Bourbon Whiskey Production.
c) Describe in detail about Quality Control followed in fermentation industries.

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

a) Describe in detail use of various types of sensors and biosensors for maintaining environmental parameters.
b) Describe in detail about product recovery and purification.
c) Describe in detail about production of biopolymers with special emphasis on Pullulan production.

Seat No.	

Set **P**

M.Sc. (Microbiology) (Campus) (Sem - III) (New) (NEP CBCS)
Examination: March/April - 2025
Immunology (2316306)

Day & Date: Monday, 19-May-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

Q.1 A) Choose correct alternative. **08**

1) _____ lymphocyte is synthesized and matured in bone marrow in humans.
a) B b) T_H
c) T_C d) Macrophages

2) _____ is secondary lymphoid organ.
a) Spleen b) MALT
c) Lymph node d) all of these

3) _____ fluorescent dyes commonly used for the labelling of antibody.
a) Fluorescein isothiocyanate b) Iodine
c) Sulphur d) Et-Br

4) The antigen peptide presented by MHC II is composed from _____ amino acids.
a) 10-12 b) 8-10
c) 14-16 d) 6-8

5) Vaccines are prepared from killed microbes called as _____ Vaccine.
a) Live b) Inactivated
c) Recombinant d) DNA

6) Auto-antibodies against acetyl choline receptors are produced in _____.
a) Myasthenia gravis
b) Systemic lupus erythematous (SLE)
c) Pernicious anemia
d) Hashimoto's thyroiditis

7) The transfer of cells, tissues or organs from one part of the body of individual to other part is called as _____.
a) Autograft b) Isograft
c) Xenograft d) Allograft

8) In the spleen the defective RBCs destroyed and removed by _____.

a) White pulp b) Red pulp
c) Marginal zone d) PALS

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

1) _____ antibody called reagenic antibody responsible for allergy.
2) In precipitation reaction when the concentration of antibody is excess it is called _____.
3) In humans MHC loci or HLA complex is present on chromosome number _____.
4) The predominant immunoglobulin in saliva is _____.

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

a) Define Xenograft.
b) What is MALT?
c) Define Autoimmunity.
d) Define Immunological tolerance.
e) What is agglutination?
f) What is Systemic lupus erythromatous?
g) Enlist antigen presenting cells?
h) Define Cytokines.

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

a) Give a short account on DNA and synthetic peptide vaccines.
b) Describe in detail precipitation reaction.
c) Explain in detail structure and function of thymus.
d) Write in detail about HLA typing.

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

a) Discuss in brief mechanism of graft rejection.
b) Describe in detail structure and function of lymph node.
c) Define immunoglobulin and write in detail types of immunoglobulin.

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

a) Give a detailed account of organ specific autoimmune disorders.
b) Describe in detail ELISA test.
c) Describe in detail structure and role of MHC I and MHC II.

Seat No.	

Set **P**

M.Sc. (Microbiology) (Campus) (Sem - III) (New) (NEP CBCS)
Examination: March/April - 2025
R-DNA technology (2316307)

Day & Date: Monday, 19-May-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

Q.1 A) Choose correct alternative. **08**

1) For transformation _____ microparticles are coated with DNA to be bombarded with a gene gun.
a) Gold or Tungsten b) Platinum or Zinc
c) Silicon or Platinum d) None of the above

2) _____ of the following is not required for DNA cloning.
a) DNA Ligase b) A Vector
c) Methylases d) None of the above

3) _____ is the first human hormone produced by recombinant DNA technology.
a) Thyroxine b) Estrogen
c) Insulin d) Progesterone

4) Each restriction enzymes cleaves a DNA molecule only at _____.
a) The ends of genes
b) Methyl groups
c) Specific palindromic sequence
d) Centre of DNA molecule

5) _____ transformation method uses high voltage to make cell membrane permeable.
a) Calcium Chloride Method b) Electroporation
c) Lipofection d) Microinjection

6) Plasmids and _____ have the ability to replicate within bacterial cells independent of the control of chromosomal DNA.
a) Bacteriophages b) Fragments
c) Bacteria d) Clones

7) One centimorgan is defined as the genetic distance between two loci with a statistically corrected recombination frequency of _____.
a) 0.1% b) 0.5%
c) 1.0% d) 5.0%

8) In blue white screening _____ is used in medium.

a) Chromogenic substrate b) Ampicillin
c) Tetracycline d) All of these

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

1) EcoR1 exhibits a two-fold rotational symmetry. (True / False)
2) Single stranded unpaired extensions formed by Restriction enzyme upon cleavage is called as _____.
3) Taq DNA polymerase is isolated from _____.
4) Monoclonal antibodies are produced by _____ technique.

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

a) Define Restriction endonuclease and give two examples.
b) Describe in short about 2μ plasmid vector.
c) Write in short ideal characters of the host for gene cloning.
d) Enlist the applications of rDNA technology.
e) Write in short about the importance of reverse transcriptase in rDNA technology.
f) Define Markers and give two examples.
g) Write in short colony hybridization.
h) Differentiate between cohesive and blunt ends

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

a) Write in details about BAC.
b) Describe in detail about method used for modification of cut ends of gene.
c) Define screening and write in short about visual screening methods.
d) Write in detail about Chromosome walking.

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

a) Define monoclonal antibody and describe in detail about applications of rDNA technology in monoclonal antibody production.
b) Define genome mapping and write in detail about restriction mapping.
c) Describe in detail the various methods used for gene transformation.

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

a) Give a detailed account of indirect screening methods for identification of recombinant clone.
b) Describe in detail about applications of the rDNA technology in Gene therapy.
c) Describe in detail about procedure of isolation of gene of interest for genetic transformation.

Seat No.	

Set **P**

M.Sc. (Microbiology Campus) (Sem - III) (Old) (CBCS) Examination: March/April - 2025
Pharmaceutical Microbiology (MSC01301)

Day & Date: Thursday, 15-May-2025 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Question No. 1 & 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) Multiple choice questions. **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*

9) Which government authority conduct audit of pharma industry in USA?
a) UNFDA b) WHO
b) Indian FDA d) US FDA

10) Which is an example of National level Pharmacopoeia?
a) European Pharmacopoeia
b) International Pharmacopoeia
c) United Nations Pharmacopoeia
d) US Pharmacopoeia

B) Write True/False **06**

1) Autoclave indicator tape is one of the Chemical indicators of sterilization.
2) The autoclave is maintained at 121° C for 15 minutes for sterilization.
3) Tetracycline is used for the treatment of fungal disease Mucormycosis.
4) Highly purified water used for preparation tablets.
5) MPN test used to test water sample in pharma industries.
6) Contact plate method is used for air sampling in clean room facility.

Q.2 Answer the following question

a) Write a short note on microbial contamination in pharmaceutical products. **04**
b) Write a short note on role of QC and QA Microbiologist in pharma industries. **04**
c) Write a short note on gaseous sterilization. **04**
d) Write a short note on chemical indicator of sterilization. **04**

Q.3 Answer the following question

a) Explain in brief about mechanism of action of Penicillin, Tetracycline and Chloramphenicol. **10**

b) Write a note on mechanism of action of Amphotericin B and 5-fluorocytosine. **06**

Q.4 Answer the following question

a) Write in brief about LAL test and Chromogenic assay for detection of pyrogen and endotoxin in pharmaceutical product. **10**

b) Write a short note on sterility assurance of pharmaceutical products. **06**

Q.5 Answer the following question

a) Write in brief about bioburden determination of pharmaceutical product. **10**

b) Write a short note on Cleanroom classification and certification. **06**

Q.6 Answer the following question

a) Write in brief about cGMP in pharmaceutical industries. **10**

b) Write a short note on Pharmacopoeia. **06**

Q.7 Answer the following question

a) Write in brief about pharmaceutical microbiology laboratory design. **10**

b) Write a short note on Vaccine clinical trial processes. **06**

Seat No.		Set	P

M.Sc. (Microbiology Campus) (Sem - III) (Old) (CBCS) Examination: March/April - 2025
Biostatistics and Bioinformatics (MSC01302)

Day & Date: Saturday, 17-May-2025 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Question No. 1 & 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. **10**

1) Ramchandran plot is used for ____.
a) Identifying errors in the backbone conformation
b) Analysing the quality of protein structures
c) Show values of φ & Ψ angles
d) All of the above

2) ____ was the first website of the life sciences and among the first 150 websites in the world.
a) Equity b) Equinox
c) Equi join d) Expasy

3) ____ is the most recent Clustal type?
a) Clustal X b) Clustal Y
c) Clustal Omega d) All of these

4) ____ is a file format which can be used for further analysis.
a) FASTA b) MASS
c) BLAST d) All

5) Protein structures are provided by ____.
a) PDB b) Pubmed
c) DBP d) All

6) ____ is the NIH genetic sequence database, an annotated collection of all publicly available DNA sequences.
a) Omega b) BLAST
c) PDB d) GenBank

7) ____ is the value that appears most often in a set of data.
a) Mode b) Median
c) Mean d) All

8) ____ In statistics refers to the likelihood or chance of an event occurring.
a) Standard deviation b) Probability
c) Presumption d) All

9) ____ is not a type of protein secondary structure.
a) Alpha helix b) beta sheet
b) Loop d) Folds

10) GOR, SOPMA are ____ protein structure prediction.
a) Primary b) Secondary
c) Tertiary d) Quaternary

B) Write true/false **06**

a) The term bioinformatics was coined by Paulien Hogeweg and Ben Hesper to describe “the study of informatic processes in biotic systems”.
b) NCBI introduces PubMed, a freely accessible bibliographic retrieval system to the entire MEDLINE database.
c) Standard deviation is a measure of how much the values in a set of data vary or deviate from the mean
d) Phylogenetic analysis is the study of the evolutionary development and relationships of a species, a group of organisms, or a characteristic of an organism.
e) Dr. Allan Maxam, a professor of biological chemistry, served as a key member in the panel for NCBI.
f) SWISS-PROT is an annotated protein sequence database, which was created at the Department of Medical Biochemistry of the University of Geneva.

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

a) Explain in detail about BLAST with its variants. **04**
b) Write a note on types of sampling. **04**
c) Describe Scope and applications of Bioinformatics. **04**
d) Write a note on Gene Bank. **04**

Q.3 Answer the following:

a) Briefly explain GOR & SOPMA. **10**
b) Write a note on primary protein structure prediction. **06**

Q.4 Answer the following:

a) Explain the diagrammatic representation of data. **10**
b) Explain random sample and sampling technique. **06**

Q.5 Answer the following:

a) Enlist and explain tools used for visualization protein structure. **10**
b) Describe the character-based methods for phylogenetic tree construction. **06**

Q.6 Answer the following:

a)	Explain in detail Local and Global alignment.	**10**
b)	Describe ANOVA with an illustration for two-way classification model	**06**

Q.7 Answer the following:

a)	Describe in detail protein information with reference to ExPASy.	**10**
b)	Describe the Hypothesis testing.	**06**

Seat No.	

Set **P**

M.Sc. (Microbiology Campus) (Sem - III) (Old) (CBCS) Examination: March/April - 2025
Medical Microbiology –II
(Viral and Fungal Diseases) (MSC01306)

Day & Date: Monday, 19-May-2025 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

Instructions: 1) Question No. 1 & 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. **10**

1) Which mosquito species are primarily responsible for Dengue fever?
a) Aedes albopictus b) Anopheles gambiae
c) Aedes aegypti mosquito d) Culex

2) ____ belongs to Orthomyxoviridae family.
a) Influenza virus b) Picorna virus
c) Adeno virus d) Herpes virus

3) Chikungunya is generally transmitted from mosquitoes to humans by two types of mosquitos_____.
a) Aedes albopictus and Aedes aegypti
b) Anopheles gambiae and Aedes aegypti
c) Anopheles gambiae and Culex
d) Both a and c

4) Which of these is not a common COVID-19 symptom?
a) Blurred vision b) A cough
c) Fever d) Inability to taste or smell

5) Influenza virus multiply in ____.
a) Cytoplasm b) Nucleus
c) Mitochondria d) Ribosome

6) Nipah virus can be transmitted by ____.
a) Fruit bats
b) Mosquito
c) Raw palm sap contaminated by bat excreta
d) Both a & c

7) 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

8) Which of the following statement(s) is/ are correct about Aspergillosis?
a) It is an infection b) It is an allergic reaction
c) It is a fungal growth d) All the above

9) Which of the following is easily blocked by antivirals?
a) Virus penetration
b) Nucleic acid replication
c) Virus absorption
d) Removal of the virus from the cell

10) Why antiviral drugs cannot cure HIV?
a) They do not block viral replication
b) They cannot block viral translation
c) They cannot block viral transcription
d) They do not penetrate the cells

B) Write true/false **06**

1) Zika virus (ZIKV) is a member of the virus family Flaviviridae
a) True b) False

2) The genetic constituent of viruses is DNA and RNA.
a) True b) False

3) Bacteria such as *Rickettsia, Chlamydia* are cultivated in yolk sac of embryonated egg.
a) True b) False

4) The viral envelope is made up of proteins, glycoproteins, and lipids.
a) True b) False

5) Hepatitis A is a waterborne disease transmitted through contaminated water and food.
a) True b) False

6) Rimantadine is used in the HIV-1 treatment.
a) True b) False

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

a) Write a note on concept of pandemic with one example.
b) Write a note on structure of an Influenza virus.
c) Explain what is antibody and interferon
d) Define antiviral drugs and enlist name of different antiviral drugs.

Q.3 Answer the following:

a) Write in detail about the structure, pathogenesis, mode of transmission and prevention of Adenovirus. **10**
b) Write a note on prevention and treatment of fungal eye infection. **06**

Q.4 Answer the following:

a) Enlist the antiviral drugs of Hepatitis virus and explain the mechanism of blockage of replication. **10**
b) Write a short note on Mucormycosis. **06**

Q.5 Answer the following:

a) Write a note on cultivation of viruses. **10**

b) Explain the mode of transmission and methods of treatment of Pneumocystis pneumonia. **06**

Q.6 Answer the following:

a) Describe in detail about structure, mode of transmission, symptoms and treatment of Ebola virus. **10**

b) Explain the technique of Real time PCR for the diagnosis of Corona virus infection **06**

Q.7 Answer the following:

a) Write a note on the role of antifungal drugs and their mechanism of action. **10**

b) Write a note on mode of transmission, symptoms and prevention of COVID-19. **06**

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Seat No.	

Set P

M.Sc. (Microbiology Campus) (Sem - IV) (New) (CBCS) Examination: March/April - 2025
Food and Dairy Microbiology (2316401)

Day & Date: Wednesday, 14-May-2025 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

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

Q.1 A) Choose correct alternative. **08**

1) _____ is an example of perishable food.
a) Sugar b) Onion
c) Wheat grain d) Milk

2) In HTST method of pasteurization milk is heated at _____ ^{o}c temperature for 15 seconds.
a) 71.7 b) 62.8
c) 150 d) 200

3) Candler is used for detection of spoilage of _____.
a) Milk b) Egg
c) Meat d) Fruit

4) _____ is main sugar present in milk.
a) Glucose b) Fructose
c) Dextrose d) Lactose

5) _____ is an example of food poisoning.
a) Botulism b) Salmonellosis
c) Shigellosis d) Malaria

6) _____ is spoilage of fatty food.
a) Putrefaction b) Taint
c) Rancidity d) Ropiness

7) _____ are used as probiotic.
a) Coliforms b) Pseudomonas
c) Lactobacillus d) Vibrios

8) _____ is an example of hard cheese.
a) Camembert b) Cheddar
c) Gouda d) Roquefort

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

1) Taint is spoilage of milk.
2) Efficiency of pasteurization is determined by phosphatase test.
3) Meat is an example of nonperishable food.
4) Globulin is main protein present in milk.

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

a) Define pasteurization.
b) Define food spoilage.
c) Give two names of organisms present in Idli fermentation.
d) Define food infections.
e) What is putrefaction?
f) What is Appertization?
g) Define Food Adulteration?
h) Give the full form of FSSAT.

Q.3 Write short notes on. (Any three) **12**

a) Spoilage of fruits and vegetable
b) Pasteurization methods of milk
c) Probiotics
d) Food laws and standards

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

a) Describe in detail sources of contamination of milk.
b) Give the general principles and methods of food preservation.
c) Describe in detail food adulteration and contamination.

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

a) Describe in detail manufacture of cheese.
b) Describe in detail food borne diseases.
c) Write an essay on fermented foods.

Seat No.	

Set **P**

M.Sc. (Microbiology Campus) (Sem - IV) (New) (CBCS) Examination: March/April - 2025
Molecular Biology and Genetic Engineering (2316402)

Day & Date: Friday, 16-May-2025 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

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

Q.1 A) Choose correct alternative. **08**

1) Which blotting technique is used to detect RNA?
   a) Southern blotting b) Northern blotting
   c) Western blotting d) Eastern blotting

2) Which method is used for the identification of individual genetic profiles?
   a) RFLP b) DNA sequencing
   c) DNA fingerprinting d) PCR-ELISA

3) Which of the following enzymes is used to join DNA fragments together?
   a) DNA Polymerase I b) T4 DNA ligase
   c) Restriction enzyme d) Alkaline phosphatase

4) Which enzyme is used to add phosphate groups at the 5' end of DNA?
   a) DNA polymerase I b) DNA ligase
   c) T4 polynucleotide kinase d) Alkaline phosphatase

5) Which of the following is a commonly used plasmid vector?
   a) $\lambda - \text{phage}$ b) pBR322
   c) Cosmid d) M13

6) What is a key feature of shuttle vectors?
   a) Can replicate in two different host species
   b) Only used in yeast
   c) Contains only a viral origin
   d) Are not suitable for gene cloning

7) Which of the following is a goal of metabolic engineering?
   a) Prevent protein degradation
   b) Modify enzymes only
   c) Optimize cellular metabolism
   d) Inhibit gene expression

8) Cosmid vectors are a hybrid of _____.
   a) Plasmids and phagemids b) Bacteriophages and plasmids
   c) BACs and YACs d) Phages and RNA viruses

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

1) FISH uses radioactive labeling to detect gene locations.
2) Microsatellites are also known as simple sequence repeats (SSRs)
3) Restriction endonucleases cleave DNA at random sites.
4) Klenow fragment is derived from DNA polymerase III.

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

a) Define Vector
b) What is the full form of RFLP?
c) What are restriction endonucleases?
d) What are DNA adaptors and linkers?
e) What is the function of reverse transcriptase?
f) Give the names of any three commonly used plasmid vectors.
g) What is the principle of DNA sequencing?
h) What does Western blotting identify?

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

a) Explain the protein engineering concept.
b) Describe the Southern Blotting technique for the detection of DNA.
c) Discuss the λ bacteriophage as a cloning vector.
d) Write a note on DNA footprinting.

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

a) Explain DNA sequencing by the Sanger dideoxy method.
b) What is Metabolic Engineering? Explain the essence of metabolic engineering.
c) Explain the various applications of Genetic engineering in Agriculture and Industry.

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

a) What is a Genomic library? Explain in detail the construction of Genomic libraries.
b) What is Gene transformation? Describe the various methods of Gene transformation.
c) Enlist the various types of PCR and explain in detail, Real-time PCR and its applications.

Seat No.	

Set | P

M.Sc. (Microbiology Campus) (Sem - IV) (New) (NEP CBCS) Examination: March/April - 2025
Agricultural Microbiology (2316405)

Day & Date: Tuesday, 20-May-2025 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

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

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

1) Major advantage of VAM to plants is _____.
a) Increased 'N2' absorption b) Increased 'P' absorption
c) Increased 'K' absorption d) Increased 'Mn' absorption

2) The region where soil and roots make contact particularly in grasslands and rich in microbial population is called _____.
a) phyllosphere b) rhizosphere
c) lithosphere d) stratosphere

3) The ability of an individual cell to develop into a whole plant is called
a) Cellular totipotency b) tissue culture
c) cell division d) none of the above

4) _____ is an example of plant growth promoting substance produced by microorganisms in the rhizosphere
a) Siderophore b) IAA
c) Gibberrllic acid d) All of the above

5) 'Cry' protein is produced by
a) Bacillus papilliae b) Bacillus sphaericus
c) Bacillus thuringiensis d) Bacillus cereus

6) Excessive use of chemical fertilizers _____.
a) Increase fertility of plants
b) Adversely affect soil quality and crop production
c) Increase crop production
d) Increase soil fertility

7) Nitrogen fixation in root nodules of Alnus is brought about by
a) Azotobacter b) Nitrobacter
c) Clostridia d) Frankia

8) The process of growing leguminous or non leguminous quickly growing plants & ploughing it into the soil is called _____

a) Town compost b) FYM
c) Green manuring d) Vermicompost

B) Fill in the blanks OR write True/False. **04**

1) Give two examples of Bioinsecticides
2) Fogg's medium is used for isolation of_____ in biofertilizer preparation.
3) Callus culture is not the method of tissue culture. **True/False**
4) Enzyme responsible for Nitrogen fixation is _____.

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

a) Define Phyllosphere
b) Define genetically modified crops with examples
c) Define IAA and its significance
d) Define C02 fixation.
e) What are carriers? Give examples
f) Explain rhizospheric effect
g) Explain Mycorrhiza and its role
h) Define phosphate solubilizing microbes with examples

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

a) Define biopesticides with examples, explain their use and significance.
b) Define ecosystem and describe soil ecosystem and its components
c) Give an account of sulphur cycle.
d) Explain green manure with example

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

a) Define tissue culture and describe techniques of tissue culture.
b) Write in detail production of Rhizobium biofertilizer
c) Define plant growth promoting substances and describe them with significance and role

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

a) Describe in detail various transformations in Nitrogen cycle
b) Write a note on commercial production and applications of *B. thuringiensis*
c) Define composting, give different methods of composting. Describe vermicompost production

Seat No.	

Set | P

M.Sc. (Microbiology campus) (Sem - IV) (New) (NEP CBCS) Examination: March/April - 2025
Environmental Microbiology (2316406)

Day & Date: Tuesday, 20-May-2025 Max. Marks: 60
Time: 03:00 PM To 05:30 PM

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

Q.1 A) Choose correct alternative. **08**

1) The biotic components of an ecosystem include:
a) Air, water, and soil
b) Producers, consumers, and decomposers
c) Sunlight and nutrients
d) Rocks and minerals

2) Which of the following is a secondary treatment method in wastewater treatment?
a) Screening b) Sedimentation
c) Activated sludge d) Chlorination

3) The major pollutants in pulp and paper mill wastewater are:
a) Cellulose, lignin, and chlorinated compounds.
b) Nitrate and phosphate
c) Organic dyes
d) Oil and grease

4) Acid rain is primarily caused by the emission of
a) Oxygen and water vapor
b) Sulfur dioxide (SO_2) and nitrogen oxides (NO_X)
c) Methane and carbon dioxide
d) Carbon monoxide and ozone

5) The enzyme Cytochrome P450 monooxygenase is involved in:
a) Hydrolyzing toxic compounds into less toxic forms
b) Degrading pesticides and industrial chemicals
c) Generating energy in mitochondria
d) Storing nutrients for microbial growth

6) Which international body is responsible for biodiversity conservation?
a) UNESCO
b) Convention on Biological Diversity (CBD)
c) WHO
d) IPCC

7) Which of the following is an application of GEMs in environmental biotechnology?
a) Fossil fuel production b) Heavy metal extraction
c) Bioremediation of oil spills d) Cloud seeding

8) Algal blooms are primarily caused by an excess of which nutrients?
a) Iron and zinc b) Nitrogen and phosphorus
c) Calcium and magnesium d) Potassium and sodium

B) Fill in the blanks. **04**

1) _____ parameter indicates the amount of oxygen required by microorganisms to break down organic matter.
2) The hydraulic retention time (HRT) in a reactor is important because it determines _____
3) To evaluate environmental performance and compliance _____ audit is performed
4) _____ is a greenhouse gas contributing to global warming.

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

a) What is biotic and abiotic environment?
b) What are red tides in eutrophication? Give its formation.
c) Give the types of industrial wastes.
d) Define Mean Cell Residence Time (MCRT).
e) What are state environmental control Bodies? Give its role.
f) What is Environmental Impact Assessment (EIA)?
g) What do you mean Global warming? How its occure
h) Define Vermicomposting?

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

a) Write on Composition and structure of the environment.
b) Describe microorganisms in waste water treatment w.r.t. source of organisms, enrichment and acclimatization.
c) Explain treatment of Dairy and Sugar industrial waste.
d) Write on acid rains and significance

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

a) Explain Eutrophication w.r.t. Definition, causes of eutrophication, and microbial changes in eutrophic bodies of water induced by various inorganic pollutants.
b) Describe basic concepts and methods of waste water treatment,
c) Write on Water pollution control, regulation, and limits for disposal into Lakes and rivers.

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

a) Describe Enzymes and Pollution w.r.t.Monooxygenases, aminotransferases, bioenergetic enzymes and other metabolic enzymes.

b) Explain on Algae in eutrophication, algal blooms, their effects and toxicity and colored waters.

c) Write on waste treatment systems w.r.t. reaction and kinetics, mass balance analysis, reactor types and hydraulic characters of reactor.

Seat No.	

Set **P**

M.Sc. (Microbiology Campus) (Sem - IV) (New/Old) (CBCS) Examination: March/April - 2025
Research Methodology (MSC01401)

Day & Date: Wednesday, 14-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question No. 1 & 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. **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
   b) 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/false **06**

   a) Journal refuses to publish articles from author who found in scientific misconducts.
   b) Preliminary Pages are the last part of the research layout.
   c) Summary is not a part of main text of the research layout.
   d) Plagiarism of the data is one of the scientific misconducts.
   e) SALAMI is one of the scientific misconducts.
   f) IMALAS is not included in scientific misconducts.

Q.2 Answer the following:

a) Write a short note on meaning and objective of research. **04**

b) Write a short note on Qualitative vs. Quantitative research and Conceptual Vs. Empirical research. **04**

c) Write a short note on design decisions and parts of the research design. **04**

d) Write a note on plagiarism. **04**

Q.3 Answer the following:

a) Write in brief about important concepts relating to research design. **10**

b) Explain briefly types of research. **06**

Q.4 Answer the following:

a) Explain in brief about first 5 steps of research process. **10**

b) Write a note on criteria of good research. **06**

Q.5 Answer the following:

a) Write in brief about different types of principal bibliographic databases. **10**

b) Write a note on personal reference databases. **06**

Q.6 Answer the following:

a) Write in brief about why scientific misconduct occurs and SALAMI. IMALAS and duplicate publication. **10**

b) Write a note on popular research report and oral presentation. **06**

Q.7 Answer the following:

a) Write in brief about layout of the research report. **10**

b) Write a note investigation and punishment of scientific misconduct. **06**

Seat No.	

Set **P**

M.Sc. (Microbiology Campus) (Sem - IV) (New/Old) (CBCS) Examination: March/April - 2025
Biosafety and Lab management (MSC01402)

Day & Date: Friday, 16-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Question No. 1 & 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) Multiple choice questions. **10**

1) Below is the list of laboratory rules except.
a) Wear lab coat, glove and cover shoes every time entering into lab
b) Never do any experiment without instruction by laboratory instructor/technician
c) Eating, drinking and smoking are prohibited inside the laboratory
d) Student can made noise during discussion inside the laboratory

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) 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

4) What is the classification of Biosafety level 1 laboratory?
a) Involve with infectious bacteria
b) The activities consider low risk to community lab
c) Involve any infectious disease bacteria but will not harm to community.
d) Involve any infectious disease bacteria and easily been spreading due to contact from one individual to another

5) 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

6) What is the function of biosafety cabinet?
   a) A primary barrier to reduce the spreading of disease caused by bacteria/microorganism into the laboratory environment
   b) A work space to culture and sub-culture the bacteria
   c) A designated space to prevent the cross-contamination due to air borne contaminant during transfer of the bacteria
   d) Provide extra ventilation to ensure enough sterilization when subculture or transfer the bacteria

7) Which class of biosafety cabinet is the most common and used for working with biological materials or organisms?
   a) Class I b) Class II
   c) Class III d) Class IV

8) Stephylococcus Cerevisia would be handled at which Risk Group?
   a) Risk Group 1 b) Risk Group 2
   c) Risk Group 3 d) None of the above

9) For research that requires Biosafety Level 2 containment, Biological Safety Cabinets must be certified by the investigator ____.
   a) Daily b) Monthly
   b) Annually d) Never, it's not important

10) When identifying risk and addressing hazards, the goal is to provide the highest ___ and the lowest practical ____.
   a) resistance/virulence
   b) attenuation/pathogenicity
   c) protection/exposure
   d) prevention/virulence

B) True or False. **06**

1) A Biohazard sign must be completed and posted on lab doors in order to meet Biosafety Level 2 containment requirements.
   a) True b) False
2) All lab personnel working in an area where biological agents are used, must be made aware of any potential hazards associated with them?
   a) True b) False
3) Infectious agent, biological materials and consumable items must be disinfected chemically or by autoclave before final disposal in biohazard waste bin.
   a) True b) False
4) The process by which all living cells, spores, and acellular entities are either destroyed or removed from an object or habitat is called sanitizer.
   a) True b) False

5) Pipet tips and microcentrifuge tubes can be stored in the biological safety cabinet.
   a) True b) False
6) Cryptococcus neoformans would be handled in Risk Group 4.
   a) True b) False

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

a) Explain general rules regarding chemical incompatibilities.
b) Write a note on Assigned roles and responsibilities of officer and committee.
c) Write a note on actions should be taken in the event of a significant chemical spills.
d) Write a note on specimen Transfer within laboratory.

Q.3 Answer the following:

a) Explain in brief about biosafety and its four level. **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) Explain in brief about Assigned roles and responsibilities in biosafety program managements. **10**
b) How Laboratory coats, Respiratory protection, Eye protection of PPE are involved in reducing risks in Heightened control? **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) Write a note on Good microbiological practice and procedure. **10**
b) Write a note on COVID-19 guideline related to WHO. **06**