Seat No.	

Set P

M.Sc. (Microbiology) (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) (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.

Seat No.	

Set P

M.Sc. (Microbiology) (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) (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.

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Set | P

M.Sc. (Microbiology) (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) (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-ZP-7

Seat No.	

Set P

M.Sc. (Microbiology) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Major Mandatory Course 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) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Major elective courseII 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) (Sem - II) (New) (NEP CBCS) Examination: March/April - 2025
Major elective coursel 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) (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) (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) (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) (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) (Sem - III) (Old) (CBCS) Examination: March/April - 2025
Molecular Biology and Genetic Engineering (MSC023301)

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

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 the correct alternative. (MCQ) **10**

1) Which blotting technique is used for detecting specific DNA sequences?
a) Southern blotting b) Northern blotting
c) Western blotting d) Eastern blotting

2) What are the microsatellite repeats?
a) Short repeats of nucleotides
b) Long sequences of RNA
c) Mutated proteins
d) Regulatory RNAs

3) Which gene is classified as a tumor suppressor?
a) MYC b) RAS
c) TP 53 d) EGFR

4) What is the main application of protein engineering?
a) Synthesis of mRNA
b) Enhancement of protein functions
c) DNA recombination
d) RNA sequencing

5) Which of the following is a commonly used label in blotting techniques?
a) Vimentin b) Biotin
c) Avidin d) Streptomycin

6) Primers used for the process of polymerase chain reaction are _____.
a) Single-stranded DNA oligonucleotide
b) Double-stranded DNA oligonucleotide
c) Single-stranded RNA oligonucleotide
d) Double-stranded RNA oligonucleotide

7) The enzyme used to remove the phosphate group from the 5' hydroxyl group is _____.
a) Restriction endonuclease b) DNA ligase
c) DNA polymerases d) Alkaline phosphatase

8) A method used to insert DNA molecules into the cells by using short electrical impulses is known as _____.
a) Biolistics b) Microinjection
c) Liposomes d) Electroporation

9) Nucleotide triphosphates (dNTPs) are added to the growing DNA strand during the _____ phase.
a) Extension/elongation b) Annealing
c) Denaturation / Separation d) Preparation

10) A technique for making millions of copies of a specific region of DNA.
a) DNA ligase b) restriction enzymes
c) gel electrophoresis d) Polymerase chain reaction

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

1) RNA is copied into complementary DNA (cDNA) by Reverse transcriptase.
2) In the semiconservative type of DNA replication, of the two newly formed molecules, one is purely a new one and the other is an old one.
3) The Western blotting technique is used in DNA fingerprinting.
4) A person with a hereditary disease can be cured with the help of gene therapy.
5) Genome-wise gene expression analysis is performed using DNA microarrays.
6) RNA polymerase is necessary to make accurate copies of vector DNA.

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

a) Discuss the Cell homeostasis.
b) Write a note on the Human genome project.
c) Write a note on DNA fingerprinting.
d) Enlist the all tools required for genetic engineering and write the information on DNA ligase.

Q.3 Answer the following question

a) Explain protein engineering. **08**
b) Discuss the identification of Genetic changes in cancer. **08**

Q.4 Answer the following question

a) Explain the cell cycle and its regulation. **08**
b) Discuss the Oncogenes and protooncogenes. **08**

Q.5 Answer the following question

a) Explain DNA sequencing by the Sanger dideoxy method. **08**

b) Enlist all blotting techniques and describe in detail the Southern blotting technique. **08**

Q.6 Answer the following question

a) Enlist all examples of plasmid vectors used for r DNA formation and write the information on Ti plasmid vectors. **08**

b) Explain the Gene therapy. **08**

Q.7 Answer the following question

a) Discuss the Screening of recombinants by Blue- white screening. **08**

b) Explain the applications of Genetic engineering in Agriculture, Industries. **08**

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Seat No.	

Set P

M.Sc. (Microbiology) (Sem - III) (Old) (CBCS) Examination: March/April - 2025
Bioprocess Technology and Fermentation Technology (MSC023302)

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

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 indicate full marks.

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

1) _____ is not used for strain improvement.
a) YDNA b) Recombination
c) Mutation d) Lyophilization

2) The levels of primary metabolites are regulated by _____ mechanism.
a) Feed back b) Dack repair
c) rDNA d) Adding inhibitor

3) In ____ reactor the mass transfer depends on the size of the bubble.
a) Double jacket b) Single jacket
c) Bubble column d) Single column

4) Cyanide is used as a precursor for _____ production.
a) Amylase b) vitB_{12}
c) Penicillin d) L-lysine

5) _____ is raw material used for alcohol fermentation.
a) Whey b) SWL
c) CSL d) Molasses

6) _____ catalyze the same reaction but are different in their control characters.
a) Isoenzymes b) Isotopes
c) Alloenzymes d) Autoenzymes

7) The aeration is mainly provided to organisms present in _____ culture.
a) Solid state b) Surface
c) Submerged d) Dry

8) Immunoaffinity chromatography is used for the purification of ___.
a) Interferon b) Antibodies
c) Insulin d) interleukin

9) Streptomycin is _____ spectrum antibiotic.
a) Narrow b) Non
c) Semi d) Broad

10) Indicator plate technique is used for primary screening of _____.
a) Antibiotic b) Vitamins
c) Organic acids d) Amino acids

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

1) Biomass is used for purification of intracellular products.
2) Monkeys are used for toxicity testing.
3) Calcium carbonate is used as antifoam agent.
4) Pullulan is widely used in drug targeting.
5) Soil is acting as major source for screening of industrially important strains.
6) L-lysine is fermented by using B. subtilis.

Q.2 Write short notes on. **16**

a) Biosafety levels for infectious agents.
b) Allergy testing.
c) Sterility testing.
d) Inoculum preparation.

Q.3 Answer the following.

a) Describe in detail vitamin B_{12} production. **08**
b) Describe in detail different types of fermetors. **08**

Q.4 Answer the following.

a) Write an essay on Fermentation media. **08**
b) Describe in detail Potent. **08**

Q.5 Answer the following.

a) Describe in details control of metabolic pathways. **08**
b) Describe in detail screening Technique. **08**

Q.6 Answer the following.

a) Write an essay on mushroom production. **08**
b) Write an essay on good manufacturing practices. **08**

Q.7 Answer the following.

a) Give in detail streptomycin production. **08**
b) Give the application of computer and automation in fermentation industry. **08**

Seat No.	

Set **P**

M.Sc. (Microbiology) (Sem - III) (Old) (CBCS) Examination: March/April - 2025
Immunology and Immunotechnology (MSC023306)

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

Instructions: 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Draw neat and labeled diagram and give equations wherever necessary.
4) Figures to the right indicate full marks.

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

1) Lactoperoxidase in _____ possess antibacterial property.
a) Milk b) Mucosa
c) gastric juice d) Urine

2) Muscle weakness is observed in _____ autoimmune disease.
a) Phacoanaphylaxis b) Myasthenia gravis
c) Pernicious anemia d) SLE

3) Major changes in the antigenic structure of influenza viruses are celled _____.
a) antigenic variation b) signal transduction
c) Attenuation d) antigenic shift

4) _____ vaccines do not require refrigeration for storage and antigen purification step.
a) Multivalent subunit b) DNA
c) Synthetic peptide d) Toxoid

5) Macrophage-like ceils present m lungs are called as _____.
a) Alveolar b) Langerhan
c) Kuffer d) Microglial

6) Lymph node and spleen are _____ lymphoid organs.
a) mucosa associated b) cutaneous associated
c) Primary d) secondary

7) Class I MHC antigens are absent on _____.
a) NK cells b) RBCs
c) Dendritic cells d) WBCs

8) Two or more cytokines that mediate similar functions are called _____.
a) Synergetic b) cascade
c) Redundant d) pleiotropic

9) _____ shows dimeric type of antibody structure.
a) IgD b) IgA
c) IgG d) IgM

10) Horse Radish Peroxidase is used in _____ antigen-antibody test.
a) ELISA b) RIA
c) immune-fluorescence d) VDRL

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

1) Thymus is primary lymphoid organ.
2) Interferon is antibacterial agent grouped in cytokine family.
3) IgD antibody is a part of BCR.
4) Sorting and enumeration of cells is possible using flow cytometry.
5) TT injection is an example of active immunity.
6) Tissue typing is not required in transplantation immunology.

Q.2 Write short notes. **16**

a) Immunoglobulin gene diversity.
b) Cytokines
c) Agglutination reaction.
d) Transplantation immunology.

Q.3 Answer the following questions. **16**

a) Write an essay on immunodeficiency diseases.
b) Explain in detail structure and functions of MHC.

Q.4 Answer the following questions. **16**

a) Describe in detail primary and secondary lymphoid organs.
b) Describe in detail types of Antibodies.

Q.5 Answer the following questions. **16**

a) Write an essay on Autoimmune diseases.
b) Explain in detail, immune response to infectious diseases.

Q.6 Answer the following questions. **16**

a) Explain in detail common vaccines with example.
b) Explain in detail ELISA and RIA with its significance.

Q.7 Answer the following questions. **16**

a) Describe in detail Innate and Acquired immunity.
b) Write in detail on, Cells of immune system.

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Seat No.	

Set P

M.Sc. (Microbiology) (Sem - IV) (New) (NEP 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) (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.

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Seat No.	

Set P

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

Day & Date: Tuesday, 20-May-2025 Max. Marks: 60
Time: 03:00 AM 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) (Sem - IV) (New) (NEP CBCS) Examination: March/April - 2025
Environmental Microbiology (2316406)

Day & Date: Tuesday, 20-May-2025 Max. Marks: 60
Time: 03:00 AM 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) (Sem - IV) (New/Old) (CBCS) Examination: March/April - 2025
Pharmaceutical Microbiology (MSC023401)

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

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 indicate full marks.

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

1) _____ of the following is a peptide antibiotic.
a) Tetracycline b) Amoxicillin
c) Chloramphenicol d) Chloramphenicol

2) Sulphonamide act by inhibiting _____.
a) Protein Synthesis b) Cell Wall Synthesis
c) Folic Acid Synthesis d) DNA replication

3) _____ of the following is frequently used as an antimicrobial preservative in ophthalmic preparation.
a) Thimerosal b) Sorbitol
c) Benzalkonium chloride d) Propylene glycol

4) _____ is a common cause of microbial spoilage in pharmaceuticals.
a) Dry heat b) Alcohol
c) Water activity (aw) d) UV radiations

5) _____ of the following microorganisms is commonly used as an indicator of sterility in Autoclave validation.
a) *Escherichia coli* b) *Bacillus stearothermophilus*
c) *Staphylococcus aureus* d) *Pseudomonas aeruginosa*

6) LAL test is done for _____.
a) Oral formulations b) Parenteral formulations
c) Liposomes d) Solid formulations

7) _____ of the following is not a desired characteristic of the organism to be used for industrial application.
a) Should produce less amount of product
b) Should be readily available
c) Should grow rapidly
d) Should be non-pathogenic

8) Some larger items of equipment now have _____ and _____ systems installed to improve decontamination capabilities.
a) Cleaning in Place (CIP) b) Sterilization in Place (SIP)
c) Both a & b d) None of the above

9) _____ of the following is not involved in the regulatory practices for pharmaceutical products.
a) FDA b) WHO
c) ISO d) NASA

10) Z value is used in the validation of _____.
a) Filter sterilization b) Gaseous sterilization
c) Heat sterilization d) Radiation sterilization

B) Fill in the blanks OR Write true/false. **06**

1) _____ type of disinfectant act by disrupting microbial membrane.
2) GMP stands for _____.
3) The Time required to kill 90% of the microorganisms in a sample at a specific temperature is the _____.
4) Parenteral preparations are prepared in _____ area.
5) Pyrogen is a _____ substance.
6) GLP regulations were implemented by FDA in _____.

Q.2 Write short notes. **16**

a) Define the antibiotics and enlist the types of antibiotic based on spectrum of activity.
b) Define Biosensors and give types and any two examples.
c) Enlist the name of enzymes and their mode of action used in pharmaceuticals.
d) Differentiate between sterilization and disinfection.

Q.3 Answer the following. **16**

a) Describe in detail spoilage of pharmaceutical products (Sterile injectables).
b) Describe in details the applications of the biosensors in pharmaceuticals.

Q.4 Answer the following. **16**

a) Give a detailed account on mode of action of any two antifungal antibiotics.
b) Describe in detail about DNA vaccines.

Q.5 Answer the following. **16**

a) Describe in detail about Mode of action of bacterial killing by Quinolinone.
b) Give a detailed account of Safety in the Microbiology Laboratory.

Q.6 Answer the following. **16**

a) Write in detail about How antibiotics penetrate bacterial defenses and reach their intracellular targets.
b) Write in detail about different types of chemical disinfectants and their applications in pharmaceutical industry.

Q.7 Answer the following. **16**

a) Describe in detail about Sterility testing and its importance in pharmaceutical production.

b) Describe the principles of Good Manufacturing Practices (GMP) and their importance in the pharmaceutical industry.

Seat No.	

Set P

M.Sc. (Microbiology) (Sem - IV) (New/Old) (CBCS) Examination: March/April - 2025
Food and Dairy Microbiology (MSC023402)

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

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 indicate full marks.

Q.1 A) Rewrite the following sentences by selecting the correct answer from alternatives given below. **10**

1) Intentionally mixing of other matter of inferior or harmful quality with food or drink is called as _____.
a) contamination b) preservation
c) adulteration d) spoilage

2) The _____ test is used to cheque efficiency of pasteurization.
a) Phosphatase b) MBRT
c) Resazurin d) MPN

3) Any change that renders food unfit for human consumption is called _____.
a) processing b) spoilage
c) deterioration d) preservation

4) Aflatoxicosis is caused by _____.
a) *Aspergillus flavus* b) *Streptococcus pyogenes*
c) *Brucella abortus* d) *Salmonella enteritidis*

5) Dahi provides an unfavorable medium for the proliferation of pathogens due to environment.
a) Salty b) Acidic
c) Neutral d) Alkaline

6) _____ organism is used for bread production.
a) E.coli b) Yeast cells
c) Streptococcus spp. d) Lactobacillus spp.

7) The time temperature relationship for Flash pasteurization is _____.
a) 62.8°C for 15 min b) 71.7°C for 15 sec
c) 71.7°C for 30 min d) 138°C for 1 sec

8) _____ is an example of soft cheese.
a) Cheddar b) Camembert
c) Cottage d) Mozzarella

9) _____ are the substances which are added to food to improve appearance, texture, flavour and keeping quality.

a) Food preservatives b) Toxins
c) Microorganisms d) Food additives

10) Acetaldehyde is the major flavour compound in _____.

a) cheese b) yoghurt
c) kefir d) kumiss

B) Fill in the blanks OR Write true/false. **06**

1) Sanitation is protection from contamination. True/False
2) Urea is not a milk adulterant. True/False
3) Long form HACCP is _____.
4) Name different types of Yoghurts.
5) Botulism is an example of food infections. True/False
6) _____ are the substances added in food to improve appearance, texture, flavour and keeping quality.

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

a) Explain Phosphatase test and its significance.
b) Antimicrobial substances present in milk.
c) Define fermented milk products and explain Kefir.
d) Define food spoilage and explain Spoilage of poultry.

Q.3 Answer the following question **16**

a) Explain microbiological examination of milk.
b) Write a note on bacterial food intoxications.

Q.4 Answer the following question **16**

a) Write a note on spoilage of milk products.
b) Define food adulteration and describe ways and examples of food adulterations.

Q.5 Answer the following question **16**

a) Describe in detail about various sources of contamination of milk.
b) Explain principles of food preservation and food preservation by high temperature.

Q.6 Answer the following question **16**

a) Describe in detail about Food laws in India.
b) Describe various tests in chemical analysis of milk.

Q.7 Answer the following question **16**

a) Describe in detail quality and safety assurance in food and dairy Industry.
b) Describe about benefits of fermented food products and explain production of Idli and Jalebi.

Seat No.	

Set P

M.Sc. (Microbiology) (Sem - IV) (New/Old) (CBCS) Examination: March/April – 2025
Principles of Bioinstrumentation and Techniques
(MSC023403)

Day & Date: Tuesday, 20-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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 indicate full marks.

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

1) The concept of pH was discovered by _____.
a) Wilson b) Jansen
c) Sorensen d) Henderson- Hasselbalch

2) The ability of a buffer solution to resist a change in pH on the addition of strong acid or alkali expressed by its _____.
a) Buffer capacity b) Concentration of H^+ ions
c) Concentration of OH^- ions d) Buffer

3) The pH electrode is an example of _____.
a) Oxygen electrode b) Optical electrode
c) Ion selective electrode d) none of these

4) In thin layer chromatography, the stationary phase is made of _____ and the mobile phase made of _____.
a) Liquid, Liquid b) Solid, Liquid
c) Liquid, Gas d) Solid, Gas

5) _____ technique is also known as colour writing.
a) NMR b) Mass spectroscopy
c) Chromatography d) Electrophoresis

6) _____ are the detecrors commonly used in High Performance Liquid Chromatography.
a) Variable wavelength b) Fluorescence
c) Electrochmical d) All of the above

7) In centrifugation frictional coefficient depends on the _____ of the biological particle
a) Size b) Shape
c) Speed of rotation d) All of the above

8) In density gradient centrifugation _____ material is commonly used for gradient preparation.
a) Caesium chloride b) Sodium bromide
c) Percoll d) all of the above

9) Agarose is a linear polysaccharide made up from basic repeating units of _____.
a) galactose and 3,6 anhydrogalactose
b) agarobiose
c) Galactose and carboxy methyl cellulose
d) Both a and b

10) _____ type of microscope used for viewing unstained cells or unstained preparation.
a) Bright field b) Phase contrast
c) Fluorescence d) Compound microscope

B) Fill in the blanks OR Write true/false. **06**

1) In PAGE polymerization of acrylamide is initiated by the addition of _____ and _____.
2) The process in which separated proteins are transferred from gel to nitrocellulose paper is called as _____.
3) _____ part of the light microscope controls the intensity of light entering in the viewing area.
4) ORD stands for _____.
5) Buffers are mixture of _____.
6) If further, electrophoresis is used for recovery of DNA from gels, the method is termed as _____.

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

a) Write in short about properties and types of objectives used in microscopy.
b) Write brief note on pH.
c) Write a note on micrometry.
d) Describe in short about paper chromatography.

Q.3 Answer the following. **16**

a) Write in detail about Principle, working and applications of the density gradient centrifugation.
b) Define Electrophoresis and write in detail on principle and applications of the SDS-PAGE.

Q.4 Answer the following. **16**

a) Give a detailed account on basic components, working and application of SEM.
b) Describe in detail about Principle, working and applications of Ion exchange chromatography.

Q.5 Answer the following. **16**

a) Describe in detail about Principle, working and applications of Atomic Absorption Spectroscopy.

b) Give a detailed account on basic components, working and application of Western Blotting.

Q.6 Answer the following. **16**

a) Write in detail about Principle, working and applications of NMR.

b) Write in detail about Principle, working and applications of the 2D gel electrophoresis.

Q.7 Answer the following. **16**

a) Describe in detail about Principle, working and applications of MALDI-TOF.

b) Describe in detail about Principle, working and applications of HPLC.

Seat No.	

Set P

M.Sc. (Microbiology) (Sem - IV) (New/Old) (CBCS) Examination: March/April - 2025
Healthcare and Diagnostic Microbiology (MSC023409)

Day & Date: Thursday, 22-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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 indicate full marks.

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

1) Which structure of bacterial pathogen used to adhere host cells?
a) Nucleus b) Fimbriae
c) Flagella d) Plasma membrane

2) Which enzyme used as an antiphagocytic factor by pathogenic bacteria?
a) Coagulase b) Amylase
c) Cellulase d) Protease

3) Which acts as a living reservoir of pathogenic viruses?
a) Soil b) Water
c) Insects d) Bats

4) Which test is used for diagnosis of *Mycobacterium tuberculosis* infection?
a) ELISA
b) WIDAL test
c) Mantoux tuberculin skin test
d) VDRL test

5) Which test is used for diagnosis of diarreagennic *E.coli* infection?
a) VDRL test
b) WIDAL test
c) Mantoux tuberculin skin test
d) HEp-2 adherence assay

6) Which test is used for diagnosis of *Leptospirosis?*
a) VDRL test
b) Microscopic agglutination test MAT
c) Mantoux tuberculin skin test
d) HEp-2 adherence assay

7) Which bacteria causes urinary tract disease?
a) *Corynebacterium diphtheriae*
b) *Streptococcus pneumoniae*
c) *E.coli*
d) *Helicobacter pylori*

8) Which organ involved in Legionellosis disease?
a) Heart b) Lungs
c) Urinary bladder d) Liver

9) Which bacteria causes epidemic typhus fever?
a) *Corynebacterium diphtheriae*
b) *Helicobacter pylori*
c) *Salmonella typhi*
d) *Rickettsia prowazekii*

10) Immunoblotting method of diagnosis involved which method?
a) Eastern blotting b) Western blotting
c) Southern blotting d) Northern blotting

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

1) *Echinococcus granulosus* is a protozoal species causes hydatid disease in humans.
2) *Ascaris lumbricoides* is the "large roundworm" that cause disease ascariasis in humans.
3) *Wuchereria bancrofti* is a protozoal species transmitted by bed bugs in humans.
4) COVID-19 is diagnosed by ELISA technique.
5) Mumps virus has single stranded RNA as a genome.
6) Histoplasmosis is a fungal infection that affect the lungs.

Q.2 Answer the following. **04**

a) Write a shot note on antiphagocytic factors. **04**
b) Write a shot note on General guidelines of specimen collection. **04**
c) Write a shot note on symptoms and mode of transmission of typhus fever. **04**
d) Write a shot note symptoms and mode of transmission of amebiasis. **04**

Q.3 Answer the following.

a) Explain in brief about stages of clinical infections, types of infections, signs and symptoms. **10**
b) Write a short note on normal flora of human body. **06**

Q.4 Answer the following.

a) Write in brief on diagnosis of *Leishmaniasis, Trepanosomacruzi, Plasmodium.* **10**
b) Write a short note on Genotypic method of disease diagnosis. **06**

Q.5 Answer the following.

a) Write in brief about gonorrhea by Legionellosis, with respect to etiological agent, mode of transmission, symptoms, epidemiology, laboratory diagnosis, prophylaxis and treatment. **10**

b) Write a short note bacterial meningitis. **06**

Q.6 Answer the following.

a) Write in brief about lymphatic filariasis with respect to etiological agent, mode of transmission, symptoms, life cycle of parasite, laboratory diagnosis, prophylaxis, treatment. **10**

b) Write a short note on mode of symptoms, diagnosis and treatment of *Giardia lamblia* infection. **06**

Q.7 Answer the following.

a) Write in brief about polio with respect structure of Polio virus, clinical manifestations, transmission, laboratory diagnosis, prophylaxis, treatment. **10**

b) Write a short note on mode of symptoms, diagnosis and treatment of Histoplasmosis. **06**

Seat No.	

Set **P**

M.Sc. (Microbiology) (Sem - IV) (New/Old) (CBCS) Examination: March/April - 2025
Recombinant DNA Technology (MSC023410)

Day & Date: Thursday, 22-May-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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 indicate full marks.
4) Draw neat labeled diagrams wherever necessary.

Q.1 A) Choose the correct alternative and rewrite the sentences again. 10

1) Phosphatases _____ phosphate groups from biological molecules.
a) Adds b) Removes
c) Multiply d) Transfers

2) _____ facilitates the joining of DNA strands together by catalyzing the formation of a phosphodiester bond.
a) Polymerase
b) Deoxynucleotidyl transferase
c) Kinase
d) Ligase

3) Cosmids are plasmids that incorporate a segment of _____ DNA.
a) Bacteriophage σ b) Bacteriophage β
c) Bacteriophage λ d) Bacteriophage μ

4) Cloning DNA fragments of more than 1 mega base (1Mb=1000kb) in size is possible in _____.
a) Yeast artificial chromosome
b) Bacterial artificial chromosome
c) Cosmid
d) Plasmid

5) Liposome is made up of _____ and used in gene transfer techniques.
a) Proteins b) nucleic acids
c) Phospholipids d) Carbohydrates

6) Screening of protein expression carried out using _____.
a) Phage display b) ELISA
c) Radio Immuno Assay d) All of these

7) Polymerase used for PCR is extracted from _____.
a) *Thermus aquaticus* b) *Escherichia coli*
c) *Homo sapiens* d) *Saccharomyces cerevisiae*

8) The enzyme used in formation of cDNA from mRNA is _____.
a) Helicase b) reverse transcriptase
c) Polymerase d) gyrase

9) The chain termination PCR is used for _____ DNA sequencing method.
a) Maxam-Gilbert b) Pasteur
c) Sanger d) Edmans

10) The PCR technique was developed by _____.
a) Kohler b) Altman
c) Milstein d) Kary mullis

B) Fill in the blanks **06**

1) _____ is an enzyme used to generate complementary DNA (cDNA) from an RNA template.
2) _____ is a commonly used cloning vector in *E. coli* and first described by Bolivar and Rodriguez.
3) _____ is a widely used analytical technique to detect specific proteins in a sample.
4) _____ is the study of the evolutionary relatedness among various groups of microorganisms.
5) _____ is a medical approach that treats or prevents disease by correcting the underlying genetic problem.
6) _____ refers to genetic resources such as seeds, tissues, and DNA sequences that are maintained for the purpose of animal and plant breeding, conservation efforts, agriculture, and other research uses.

Q.2 Write short notes on the following. **16**

a) PAGE
b) GEMO
c) FACS
d) SV40

Q.3 Answer the following.

a) Explain the genetic engineering with respect to its approach, advantages and limitations. **08**
b) Describe in detail essential enzymes used in recombinant DNA technology. **08**

Q.4 Answer the following.

a) Explain in detail properties, applications and limitations of vector pBR322. **08**
b) Describe in detail properties, applications and limitations of higher capacity vectors. **08**

Q.5 Answer the following.

a) Explain in detail principle and methodology of construction of genomic and cDNA library. **08**

b) Describe in detail methodologies used for screening of protein expression. **08**

Q.6 Answer the following.

a) Explain in detail PCR technology and its application in microbiology. **08**

b) Describe in detail production of insulin and hepatitis B surface antigen using GE. **08**

Q.7 Answer the following.

a) Explain in detail principle, methodology, advantages and disadvantages of Microarray. **08**

b) Describe in detail principle, technique and application of chromosome walking. **08**