Seat No.	

Set **P**

M.Sc. (Microbiology) (Semester - I) (New) (NEP CBCS)
Examination: October/November - 2025
Microbial Diversity and Taxonomy (2316101)

Day & Date: Wednesday, 29-10-2025 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) Some hyperthermophiles that grow in highly acidic (pH2) habitats belong to the two groups called _____.
   a) Cyanobacteria and Diatoms
   b) Liverworts and Yeasts
   c) Eubacteria and Archaea
   d) Protists and Mosses

2) _____ organisms are found in extreme saline conditions.
   a) Halophiles b) Thermophiles
   c) Psychrophiles d) Hyperthermophiles

3) Percent Similarity (%S) of each strain to every other strain is calculated by _____ method.
   a) Intuitive Method b) Numerical Taxonomy
   c) Genetic Relatedness d) DNA homology experiments

4) The correct order of taxonomic groups from higher to lower rank is __.
   a) Kingdom—Order—Class—Family
   b) Order—Class—Division—Family—Genus—Species
   c) Kingdom—Order—Division—Family—Class—Genus—Species
   d) Kingdom—Division—Class—Order—Family—Genus—Species

5) The symbiotic association of algae and fungi is known as _____.
   a) Lichen b) Mycorrhiza
   c) Parasites d) Xeroderma

6) _____ organisms have thick peptidoglycan in their cell wall.
   a) Gram-negative bacteria b) Gram-positive bacteria
   c) Yeast d) Molds

7) In Dinoflagellates, the reserve food is _____.
   a) Fucoxanthin b) Starch
   c) Alginic acid d) Mannitol

8) Trypanosoma belongs to _____ group of protozoa.
   a) Mastigophora b) Sarcodina
   c) Sporozoan d) Ciliata

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

1) Methanogens belong to archaebacteria.
2) The cytoplasm of mycoplasma contains ribosomes, but lacks mesosomes.
3) *Thiomargarita namibiensis* is a smallest organism can be seen by unaided eye.
4) The G+C ratio in the genome of all microbes is always 50%.

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

a) Define Taxonomy.
b) What is endosymbiosis?
c) Define psychrophiles'.
d) Enlist mode of reproduction in yeasts.
e) What is dead sea?
f) Enlist the applications of extremozymes.
g) Enlist the applications of methanogens.
h) Define Barophiles.

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

a) Give a short account on types of species and add a note on prokaryotic species.
b) Describe in detail halotolerance of halophiles.
c) Explain in detail general characteristics of algae and add a outline of algal classification.
d) Write in detail Haeckel's three kingdom classification.

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

a) Discuss in brief why 16s rRNA sequencing is most important in systemic bacteriology.
b) Describe in detail general characteristics of lichen and mycorrhiza.
c) Define thermophiles and explain in detail habitat, ecological aspects and classification of thermophiles.

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

a) Give a detailed account on morphological, physiological and metabolic characteristics used in bacterial taxonomy.
b) Describe in detail general characteristics and classification of fungi.
c) Describe in detail classification, habitats and application of alkalophiles.

Seat No.		Set	P

M.Sc. (Microbiology) (Semester - I) (New) (NEP CBCS) Examination: October/November - 2025
Recent Trends in Virology (2316102)

Day & Date: Friday, 31-10-2025 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) Viruses outside their host cells survives as _____.
   a) Prophage b) Capsid
   c) Capsomer d) Virions

2) One step growth curve is used to study the _____ of viruses.
   a) Multiplication b) Inhibition
   c) Origin d) Transmission

3) Contractile sheath and tail is present in _____ phages.
   a) P_{22} b) T_2
   c) HIV d) Picorna

4) Plant viruses penetrate host cell through transient ores called ____.
   a) Endodesmata b) Cytodes
   c) Ectodesmata d) Protodes

5) For cultivation of viruses the fertile chicken egg should be incubated for _____ days.
   a) 5 - 12 b) 2 - 3
   c) 21 - 22 d) 50

6) _____ infection is also called lytic infection.
   a) Latent b) Null
   c) Abortive d) Cytopathogenic

7) Viruses that cause or give rise to tumor are called _____ viruses.
   a) Avirulent b) Oncogenic
   c) Lysogenic d) Latent

8) _____ is used as clinical specimen for diagnosis of corona virus infection.
   a) Blood b) Urine
   c) Nasopharyngeal swab d) Stool

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

1) Nipah henipavirus is a Bat borne virus.
2) Viruses possesses spikes composed of carbohydrates.
3) Sandwich ELISA requires two antibodies
4) The family of Rhabdoviridae possesses dsRNA.

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

a) Give the two examples of topical antiviral chemicals.
b) Define viriods.
c) What is use of HELA cells?
d) What is meaning of Benign Tumor?
e) Give the two examples of Antinfluenza drugs.
f) Define defective phages.
g) What is latent infection?
h) How EBOLA virus transmitted?

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

a) Describe in brief assay of viruses.
b) Describe in brief Genetic analysis of viruses.
c) Describe in brief Animal viruses.
d) Describe in brief pathogenesis of plant viruses.

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

a) Describe in detail Host and viral factors involved in pathogenesis.
b) Describe the methods of classification and nomenclature of viruses.
c) Describe various methods used for cultivation of viruses.

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

a) Describe in detail corona virus infection.
b) Gives in detail various methods used for central of viral infections.
c) Describe in brief Oncogenesis.

Seat No.		Set	P

M.Sc. (Microbiology) (Semester - I) (New) (NEP CBCS)
Examination: October/November - 2025
Diagnostic Microbiology (2316107)

Day & Date: Monday, 03-11-2025 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) In a BSL-2 laboratory, what type of protective clothing is typically required for laboratory personnel?
   a) Lab coat and gloves
   b) Lab coat, gloves, and safety goggles
   c) Lab coat, gloves, safety goggles, and a face mask
   d) Lab coat, gloves, safety goggles, and a face shield

2) Following methods of diagnosis utilize labelled antibody except_____.
   a) ELISA b) Haemagglutination inhibition
   c) Radioimmunoassay d) immunofluorescence

3) _____enzyme is used in ELISA test.
   a) alkaline phosphatase b) Glucose oxidase
   c) Amylase d) oxidase

4) An enrichment medium thioglycolate broth is used to enrich _____.
   a) Streptococcus b) E. coli
   c) Clostridium d) Helicobacter

5) Ascaris lumbricoides, a roundworm, infects humans via _____.
   a) fecal-oral route b) respiratory tract
   c) blood d) direct contact

6) Direct fluorescent antibody test is safer method for microscopic diagnosis of_____.
   a) Tuberculosis b) Rubella
   c) Syphilis d) Leprosy
   .

7) _____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

8) ____virus causes chicken pox disease.
   a) Rhabdo b) Varicella
   c) Rubeola d) Rubella

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

1) *Helicobacter pylori* produces powerful urease enzyme. True/False.
2) In complement fixation test hemolysis indicates positive test. True /False.
3) Colored product is the result of ELISA test. True/False.
4) Koplik spot formation in buccal mucosa is the specific symptom in Measles disease. True/False.

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

a) Usage and significance of BSL-4 biosafety cabinet.
b) Causative agent of Ascariasis and its morphology.
c) Enlist Traditional methods commonly used to diagnose bacterial diseases.
d) Define human microbiome.
e) Explain leptospirosis.
f) What is probiotic therapy?
g) Define hazardous waste and its labelling.
h) Principle of autoclave

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

a) General guidelines for collection of clinical samples.
b) RFLP.
c) Explain complement fixation test.
d) Life cycle of *Balantidium coli.*

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

a) Describe Rubeola virus infection and its diagnosis.
b) Describe any three serological methods for diagnosis of diseases.
c) Write in detail about Herpes simplex virus infection.

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

a) Describe ELISA test.
b) Discuss pathogenicity, symptoms and diagnosis of Helicobacter pylori.
c) Discuss PCR technique for diagnosis of microbial disease.

Seat No.		Set	P

M.Sc. (Microbiology) (Semester - I) (New) (NEP CBCS)
Examination: October/November - 2025
Techniques in Microbiology I (2316108)

Day & Date: Monday, 03-11-2025 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 sentences by selecting correct answer from given alternatives. **08**

1) Ninhydrin solution is used as _____ in paper chromatography.
   a) Solid phase b) Locating agent
   c) Mobile phase d) Adsorbent

2) NMR spectroscopy is used to determine____ property of molecules.
   a) Color b) Mass
   c) Atomic structure d) Magnetic properties of nuclei

3) _____type of radiation is detected in radioisotopic techniques.
   a) Ultraviolet radiation b) Infrared radiation
   c) Gamma radiation d) Visible light

4) Which chromatography technique uses paper as the stationary phase?
   a) Paper chromatography b) Gas chromatography
   c) Column chromatography d) Affinity chromatograph

5) In Laminar air flow _____filter is used.
   a) HEPA b) Membrane
   c) Seitz d) Whatsman

6) The principle of UV-Visible spectrophotometry work on ____.
   a) Absorption of visible light
   b) Emission of gamma rays
   c) Absorption of ultraviolet and visible light
   d) Reflection of light

7) _____Metal is used with nanoparticles for antibiotic delivery.
   a) Gold b) Silver
   c) Zinc d) Titanium

8) _____of the following is an accurate method to determine the pH of an aqueous solution.

a) Litmus b) Phenolphthalein
c) Phenol red d) pH meter

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

1) Agarose gel is most commonly used gel for separation of DNA- True/False
2) Electrophoresis is not used to separate DNA. True/False
3) Rf value=_____.
4) A colorimeter operates on Beer-Lambert's law and measures the absorbance of light at a specific wavelength. True/False

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

a) Give the principle of NMR.
b) Explain confocal fluorescence Microscopy.
c) What is IR spectroscopy?
d) What is principle of colorimeter?
e) Give the uses of Analytical centrifuge.
f) Principle and uses of paper chromatography.
g) Give Principle of Scanning Electron Microscope.
h) Give application of Carbon nanotubes.

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

a) Give the principle working and applications of pH meter.
b) Describe in brief Autoradiography.
c) Describe in detail thin layer chromatography.
d) Write a note on Laminar Airflow.

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

a) Describe the principle and instrumentation of UV - visible spectrophotometry.
b) Describe the different methods of nanoparticle synthesis and their applications in biology and medicine.
c) Describe in brief Agarose gel electrophoresis.

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

a) Describe the principles and applications of electrophoretic techniques such as SDS-PAGE.
b) Describe in brief Atomic absorption spectroscopy.
c) Give the principle, working and applications of Centrifuge.

SLR-HP-5

Seat No.	

Set P

M.Sc. (Microbiology) (Semester - I) (New) (NEP CBCS) Examination: October/November - 2025
Research Methodology (2316103)

Day & Date: Thursday, 06-11-2025 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 type of research focuses on solving practical problems?
a) Basic research b) Applied research
c) Theoretical research d) Descriptive research

2) Which of the following factors is important when selecting a research problem?
a) The problem must have theoretical or practical importance
b) The problem should be impossible to solve
c) It should focus only on subjective opinions
d) The problem should only interest a small group of people

3) When performing a literature survey, which type of sources should be prioritized?
a) Non-academic blogs and opinion pieces
b) Peer-reviewed journal articles, books, and authoritative reports
c) Unverified online content
d) Sources without any citations or references

4) Primary data is defined as: ____.
a) Data collected directly from first hand sources for the specific purpose of the study
b) Data that has been previously collected by someone else
c) Data obtained from books and journals
d) Information collected from government records

5) The Materials and Methods section of a research paper primarily include: ____.
a) A detailed discussion of the results
b) A description of how the research was conducted, including materials and procedures used
c) The conclusion of the study
d) A list of references used in the research

6) Survey research is used to: ____.
a) Analyze historical documents
b) Collect data from a large population through structured questionnaires
c) Observe behaviours in their natural setting
d) Conduct experiments in a laboratory

7) A hypothesis is best defined as: ____.
a) A random guess about a research topic
b) A tentative statement or prediction that can be tested by research
c) A conclusion drawn after conducting research
d) A theory that has already been proven

8) A researcher studying genomic data would most likely use which of the following NCBI resources?
a) Google News
b) NCBI's GenBank
c) Facebook
d) PubMed Central

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

1) The IMRAD format stands for ____.
2) ____ is hypothesis that states there is no significant effect or relationship between variables.
3) ____ search engine offers a citation count that helps in identifying highly influential research articles.
4) ____ is written set of questions used to gather information from respondents.

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

a) Give Objectives of research.
b) What is the concept of descriptive research?
c) What is PUBMED? Give its importance.
d) What is primary data?
e) What is the content of abstract?
f) Write on utility of research.
g) Explain concept of independent variables.
h) What is literature survey?

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

a) What are sources of data collection?
b) Describe defining the problem in research.
c) Explain types of research.
d) Give the characteristics of good hypothesis.

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

a) Write on use of search engines like Google, NCBI and PUBMED.

b) What are tools and techniques of data collection?

c) What are material and methods? Explain with respect to contents, sources, procedures and techniques.

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

a) Explain discussion in research with respect to components and sequences, analysis, comparison, and integration of data.

b) What is the meaning and importance of h-index, Scopus, Web of science, Google scholar?

c) Explain hypothesis and methods of research.

SLR-HP-6

Seat No.	

Set P

M.Sc. (Microbiology) (Semester - II) (New) (NEP CBCS) Examination: October/November - 2025
Pharmaceutical Microbiology (2316201)

Day & Date: Tuesday, 28-10-2025 Max. Marks: 60
Time: 11:00 AM To 01:30 PM

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

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

1) Which of the following is not a characteristic of an ideal antimicrobial agent?
a) Selective toxicity b) Broad spectrum
c) Rapid excretion d) Low resistance development

2) Which class of antibiotics inhibits bacterial cell wall synthesis?
a) Aminoglycosides b) Tetracyclines
c) Beta-lactams d) Macrolides

3) Which mechanism is responsible for bacterial resistance?
a) Target mimicry b) Drug inactivation
c) Decreased uptake d) All of the above

4) Which chemical is commonly used for gaseous sterilization?
a) Ethanol b) Formaldehyde
c) Ethylene oxide d) Isopropyl alcohol

5) What is the primary use of liposomes in pharmaceuticals?
a) Sterilization b) Drug delivery
c) Diagnosis d) Preservation

6) Which is not a method of sterility testing?
a) Membrane filtration b) Direct inoculation
c) ELISA d) All of the above

7) Which of the following is a synthetic drug carrier?
a) Liposomes b) Niosomes
c) Nanoparticles d) All of the above

8) Which of the following organizations is responsible for food safety certification in India?
a) ISO b) WHO
c) FSSAI d) FDA

B) Write True or False: **04**

1) Hepatitis B is an example of a DNA vaccine.
2) Streptokinase is produced by microbial fermentation.
3) Temperature change required to reduce the microbial population by one log at a constant temperature is called as Z Value.
4) Antibiotics are effective against viral infections.

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

a) Define Antiseptic and disinfectant?
b) Enlist the characteristics of ideal antimicrobial agent.
c) Define GMP.
d) Define USP.
e) Define D Value.
f) Define Multivalent Vaccine.
g) Enlist the Application of microbial enzymes in pharmaceutical sector.
h) Enlist the preservatives used in pharmaceutical industry.

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

a) Describe in detail microbial contamination of ophthalmic preparation.
b) Explain in detail about biosensors used in pharmaceutical industry.
c) Explain in detail the role of chemical and biological indicators used in pharmaceutical industry.
d) Explain the role of BIS in quality assurance of pharmaceutical products.

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

a) Explain in detail the classification of antibiotics with suitable examples.
b) Write a note on drug delivery systems used in gene therapy.
c) Describe the methods of sterilization control and sterility testing in the pharmaceutical industry.

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

a) Describe in detail about safety in microbiology laboratory.
b) Describe in detail about synthetic peptide vaccine.
c) Explain in detail- bacterial resistance to antibiotics.

SLR-HP-7

Seat No.	

Set P

M.Sc. (Microbiology) (Semester - II) (New) (NEP CBCS) Examination: October/November - 2025
Microbial Biochemistry (2316202)

Day & Date: Thursday, 30-10-2025 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) The ∝-helix and β-pleated sheet are examples of _____ level of protein structure.
   a) primary b) secondary
   c) tertiary d) quaternary

2) _____ is a fat-soluble vitamin.
   a) Vitamin B12 b) Vitamin C
   c) Vitamin D d) Vitamin B6

3) In the Michaelis-Menten equation, what does Km represent?
   a) Maximum velocity
   b) Substrate concentration at half Vmax
   c) Enzyme concentration
   d) Activation energy

4) _____ type of inhibition can be reversed by increasing substrate concentration.
   a) Non-competitive b) Competitive
   c) Irreversible d) Uncompetitive

5) _____ enzyme is a classic example of acid-base catalysis.
   a) Lysozyme b) Chymotrypsin
   c) Isomerase d) Peptidase

6) Pyruvate dehydrogenase complex is an example of _____.
   a) Allosteric enzyme b) Multienzyme complex
   c) Isoenzyme d) Zymogen

7) In Briggs and Haldane modification of M-M equation, which assumption is made?
   a) Steady-state assumption
   b) Rapid equilibrium
   c) Irreversible binding
   d) No intermediate formation

8) In feedback inhibition, the end product _____.
   a) Activates the first enzyme
   b) Inhibits the first enzyme
   c) Inhibits the last enzyme
   d) Destroys the enzyme

B) Write True or False: **04**

1) All amino acids are optically active.
2) The Lineweaver-Burk plot is a double reciprocal plot.
3) Metal ions in enzymes always act as inhibitors.
4) Osmosis refers to the movement of solutes across a membrane.

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

a) What is the monomer unit of cellulose?
b) Name two fat-soluble vitamins.
c) What is the role of metal ions in enzyme activity?
d) What is an allosteric enzyme?
e) Give the name of any one microbial pigment.
f) What does Vmax represent?
g) Which enzyme converts superoxide radicals to hydrogen peroxide?
h) Define zwitterion.

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

a) Enlist the various types of carbohydrates and explain polysaccharides with examples.
b) Write a note on Bacteriorhodopsin.
c) Explain the competitive enzyme inhibition.
d) Describe the secondary structure of the Protein.

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

a) Discuss the Ramachandran Plot.
b) Describe the structure, functions, and examples of fat-soluble vitamins.
c) Discuss the significance of Km and Vmax in enzyme kinetics.

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

a) What is enzyme catalysis? Explain the activation energy barrier.
b) What are lipids? Explain types of lipids and the structure of fatty acids.
c) Derive the Michaelis-Menten equation.

SLR-HP-8

Seat No.	

Set P

M.Sc. (Microbiology) (Semester - II) (New) (NEP CBCS) Examination: October/November - 2025
Bioinformatics and Biostatistics (2316207)

Day & Date: Saturday, 01-11-2025 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) What does BLAST stand for?
   a) Basic Local Alignment Search Tool
   b) Biological Listing and Search Tool
   c) Basic Listing of Available Sequences and Trees
   d) Biological Location Analysis System and Tool

2) Which database provides free access to full-text biomedical and life sciences journal articles?
   a) Science Direct b) Scopus
   c) Google Scholar d) PubMed Central (PMC)

3) Phylogenetic analysis is used to study: ____.
   a) Protein folding
   b) Evolutionary relationships between organisms
   c) Weather patterns
   d) Gene therapy techniques

4) Which technology is most commonly associated with functional genomics?
   a) Mass spectrometry b) X-ray crystallography
   c) DNA microarrays d) PCR

5) GEN BANK is a: _____.
   a) Protein structure database
   b) Nucleotide sequence database
   c) Metabolic pathway database
   d) Enzyme activity database

6) Which server is commonly used for 3D structure prediction of proteins?
   a) SWISS-MODEL b) GenBank
   c) OMIM d) GEO
   .

7) Secondary data is: ____.
   a) Data directly collected through surveys
   b) Data gathered by someone else for another purpose
   c) Data collected only through experiments
   d) Raw. unprocessed data

8) In hypothesis testing, the statement being tested is called: ____.
   a) Alternative hypothesis b) Research hypothesis
   c) Null hypothesis d) Critical hypothesis

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

1) In Chi-square test, the data should be ____.
2) Standard deviation means ____.
3) ____ is the best database to find a protein structure file to open in RasMol.
4) ____ database provides citation information along with abstracts of scientific articles.

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

a) What are databases in Bioinformatics? Give examples.
b) What is Phylogenetic analysis? Give its importance.
c) What is gene prediction? Give its importance.
d) What is data? Give its types.
e) What is Probability? Give its properties.
f) Write on GenBank? Give its functions.
g) Define Genomics and Proteomics with importance.
h) Define DNA microarray? Give its uses.

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

a) Describe Sampling methods.
b) Explain Chi-square (X^2) test for goodness of fit.
c) Write on database similarity searches-BLAST and FASTA.
d) Explain Neighbors-Relation and Neighbor-Joining.

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

a) Write on demonstration of databases (GENBANK. PDB. OMIC and OMIM).
b) Explain diagrammatic and graphical representation of data.
c) Give introduction and describe types of ANOVA.

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

a) Explain open access bibliographic resources and literature databases.
b) Describe functional genomics w.r.t. application of sequence-based and structure-based approaches to the assignment of gene functions.
c) Write on bioinformatics-based tools for analysis of proteomics data and Prediction of the 3D structure of proteins.

SLR-HP-9

Seat No.	

Set P

M.Sc. (Microbiology) (Semester - II) (New) (NEP CBCS) Examination: October/November – 2025
Physiology and Metabolism (2316208)

Day & Date: Saturday, 01-11-2025 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) The transport mechanism that chemically modifies the nutrient as it is brought into the bacterial cell is called _____.
   a) Simple diffusion b) Facilitated diffusion
   c) Active transport d) Group translocation

2) Permeases, such as those that transport amino acids in *E. coli,* primarily function as components of ____ systems.
   a) Active transport b) Simple diffusion
   c) Passive transport d) Group translocation

3) The theory that explains ATP synthesis during ETC by linking a proton gradient across the membrane to phosphorylation is the _____ theory.
   a) Substrate-level b) Chemiosmotic
   c) Inductive coupling d) Allosteric

4) The main purpose of anaplerotic reactions in the Citric Acid Cycle is to _____ intermediates.
   a) Oxidize b) Degrade
   c) Replenish d) Decarboxylate

5) The synthesis of non-essential amino acids often involves the simple transfer of an amino group from one molecule to an a-keto acid through a process called _____.
   a) Decarboxylation b) Transamination
   c) β-Oxidation d) Anaplerosis

6) In drug metabolism, Phase I reactions primarily introduce a functional group, such as a hydroxyl group, often catalyzed by the _____ system.
   a) Transferase b) Cytochrome P450
   c) Glutathione d) Reductase

7) _____ are specialized signaling molecules produced by microorganisms to coordinate population wide behaviors, such as biofilm formation or virulence factor expression.
   a) Phages
   b) Microbial hormones (or Autoinducers)
   c) Compatible solutes
   d) Peroxidases

8) When a microbial cell is placed in a hypertonic solution, water leaves the cell, causing the plasma membrane to separate from the cell wall, a process called _____.
   a) Reverse osmosis b) Turgor
   c) Plasmolysis d) Swelling

B) Write True or False: **04**

1) Simple diffusion and active transport are both classified as forms of passive transport.
2) The amphibolic nature of the TCA Cycle means its intermediates can only be used for catabolic reactions.
3) The β-ketoadipate pathway is a central route for the microbial catabolism of aromatic hydrocarbon compounds.
4) De novo synthesis of purines builds the complete ring structure directly onto a ribose sugar backbone.

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

a) Why cell membrane is known as semipermeable membrane?
b) What is the primary function of the TCA cycle in cellular respiration?
c) Where in the cell, synthesis of saturated fatty acids primarily take place.
d) Which is the primary product of the complete combustion of a hydrocarbon.
e) How does superoxide dismutase (SOD) act as the first line of defense?
f) What is the role of Autoinducer-2 (AI-2)?
g) What is Reverse osmosis?
h) Why Citric Acid Cycle is known as amphibolic in nature?

Q.3 Write short notes. (Any Three) **12**

a) Microbial hormones
b) Purines and pyrimidine biosynthesis
c) Mitochondrial shuttle system
d) Passive transportation

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

a) Write in detail on oxidation of alkanes and alkenes.
b) Explain in detail on oxygen toxicity.
c) Describe in detail various transport mechanisms across the cell membrane.

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

a) Explain in detail bacterial ETC.
b) Describe in detail mechanism of osmotic stress management.
c) Write in detail on bacterial permeation.

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Seat No.	

Set P

M.Sc. (Microbiology) (Semester - III) (New) (NEP CBCS)
Examination: October/November - 2025
Principles of Bioinstrumentation and techniques (2316301)

Day & Date: Wednesday, 29-10-2025 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 H^+ ion concentration in pure water.
   a) 1×10^{-7} M b) 1×10^{14} M
   c) None of these d) 1×10^{7} M

2) ____ electrophoresis method most commonly used for the separation of DNA.
   a) Vertical agarose b) Horizontal agarose
   c) Vertical PAGE d) Horizontal PAGE

3) ____ component of HPLC system is responsible for separation of compounds.
   a) Pump b) Injector
   c) Column d) Detector

4) In Gas chromatography ____ is a most sensitive detector commonly used for detection of organic compounds.
   a) Mass Spectrometer (MS)
   b) Ultraviolet-Visible detector (Uv-Vis)
   c) Flame ionization detector (FID)
   d) Thermal conductivity detector (TCD)

5) Phase contrast microscopy is a technique used to visualize ____.
   a) Dead microbes b) Fixed tissue
   c) Stained cell d) Live cells

6) ____ type of spectroscopy used for the identification of functional groups in organic compounds.
   a) Mass Spectrometry (MS)
   b) Infra-red Spectroscopy (IR)
   c) Ultra-visible Spectroscopy (Uv-Vis)
   d) Nuclear magnetic resonance (NMR)

7) The separation of ions in the mass spectrometry takes place on the basis of ____.
   a) Mass to charge ratio b) Charge
   c) Solubility d) Molecular weight

8) ____ is the wavelength of UV light used in Ultra-visible Spectroscopy.
   a) 700 nm-1mm b) 0.01-10nm
   c) 100 nm- 400 nm d) 400 nm- 700 nm

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

1) ____ is the staining method is used in SDS- PAGE for the better resolution of minute bands of protein.
2) ____ is the PH of solution consisting 1 X 10^8 M [H^+] ion concentration.
3) ____ chromatography is used for the separation of antibody from solution mixture.
4) The region of electromagnetic spectrum in nuclear magnetic resonance is radio frequency.

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

a) What is dead volume referring in HPLC system?
b) What is function of glycerol and APS in PAGE?
c) Enlist types of objective lens.
d) Define pKa and pI.
e) What is ESI and MALDI?
f) Define buffer.
g) Give the principle of IR spectroscopy.
h) What is numerical aperture?

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

a) What is principle and application of mass spectrometry?
b) Give the application of 2D and SDS-gel Electrophoresis.
c) Explain in detail principle, types, and applications of electron microscope.
d) Write in detail about affinity chromatography.

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

a) Discuss in brief gel permeation chromatography.
b) Describe in detail principle, working and applications of Atomic Absorption spectroscopy.
c) Explain in detail principle and application of Density gradient centrifugation.

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

a) Give a detailed account on ion exchange chromatography. Add a note on its applications.
b) Describe in detail principle, working and applications of Uv- Visible spectrophotometer.
c) Explain in detail Agarose gel electrophoresis.

Seat No.	

Set P

M.Sc. (Microbiology) (Semester - III) (New) (NEP CBCS) Examination: October/November - 2025
Bioprocess technology (2316302)

Day & Date: Friday, 31-10-2025 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) A fibrous mass of mycelium growing on dead organic matter during mushroom cultivation is called as _____.
   a) Compost b) Spawn
   c) Canning d) Manuring

2) A set standard used to regulate own or community activity in relation to biological world is _____.
   a) Biopotency b) Biowar
   c) Bioethics d) Biopiracy

3) The Vortex formation during fermentation process is prevented by _____.
   a) Pump b) Impeller
   c) Sparger d) Baffles

4) Preliminary or Sham test is used for _____ testing of product.
   a) Toxicity b) Carcinogenicity
   c) Allergy d) Pyrogenicity

5) The commercial production of Vitamin B12 is carried out by _____.
   a) *Penicillium notatum*
   b) *Aspergillus oryzae*
   c) *Pseudomonas aeruginosa*
   d) *Propionibacterium freudenreichii*

6) _____ is used for production of xanthan gum.
   a) *Bacillus subtilis*
   b) *Pseudomonas aeruginosa*
   c) *Xanthomonas campestris*
   d) *Escherichia coli*

7) The recovery of streptomycin is carried out by ____ chromatography.
   a) Ion exchange b) Paper
   c) Hydrophobic d) Size exclusion

8) The antifoam agent reduces the surface tension of foam and increases _____ transfer rate during fermentation.
   a) Oxygen b) Nitrogen
   c) Carbon dioxide d) Hydrogen

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

1) A symbol, word, or words legally registered or established by use as representing a company or product is called _____.
2) _____ is used as a precursor in Vit B_{12} fermentation.
3) GMP stands for _____.
4) The purification and recovery of the production after fermentation is called as _____.

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

a) What is advantage of Strain improvement?
b) Define copyright.
c) Enlist types of fermenters.
d) Define scale up.
e) What is Lyophilization?
f) Define Bioethics.
g) Enlist applications of alginate.
h) Enlist examples of patenting of biological material.

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

a) Write in detail amylase production.
b) Describe in detail carcinogenicity testing.
c) Explain in detail methods of screening.
d) Explain in detail IPR and its types.

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

a) Discuss in detail account on mushroom cultivation.
b) Describe in brief various raw materials used for designing of fermentation media.
c) Explain in detail production of whisky.

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

a) Give a detailed account on design and construction of fermenter.
b) Describe in detail recovery of fermentation media by distillation and liquid-liquid extraction.
c) Write in detail Micro-organisms involved, media & product recovery of streptomycin production.

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Seat No.		Set	P

M.Sc. (Microbiology) (Semester - III) (New) (NEP CBCS)
Examination: October/November - 2025
Immunology (2316306)

Day & Date: Monday, 03-11-2025 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) ____ of the following does not protect body surfaces.
   a) Skin b) Mucus
   c) Hair Follicles d) Salivary Amylase

2) The antigens for ABO and Rh blood groups are present on ____.
   a) Plasma b) White blood cells
   c) Red blood cells d) Platelets

3) Eosinophils do not ____.
   a) Stain with basic stains b) Contain major basic protein
   c) Contain Peroxidase d) Have C3b receptors.

4) Plasma cells are ____.
   a) Derived from T-cells
   b) Develop into B Cells
   c) Secrete a large amount of Gamma interferon
   d) Have highly developed rough endoplasmic reticulum

5) Immunological unresponsiveness to self-antigen is called as ____.
   a) Tolerance b) Tolerogen
   c) ADCC d) Acquired immunity

6) ____ of the following is a non-organ-specific (systemic) autoimmune disease.
   a) Myasthenia gravis
   b) Systemic lupus erythematous (SLE)
   c) Pernicious anemia
   d) Hashimoto's thyroiditis

7) A graft between members of the same species is termed as ____.
   a) Autograft b) Isograft
   c) Xenograft d) Allograft

8) The first production of live but non-virulent forms of chicken cholera bacillus was achieved by ____.
   a) Pasteur b) Salk
   c) Jenner d) Sabin

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

1) Clonal selection occurs when a B-lymphocyte encounter _____.
2) The basic immunoglobulin unit is composed of _____.
3) The MHC class 1 heavy chain consists of ____.
4) ____ antibody is present in breast milk.

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

a) Write note on properties of IgE.
b) Describe in short about Bone Marrow.
c) Define Autoimmunity.
d) Define Immunoprophylaxis.
e) Write in short about pernicious anemia.
f) Write note on Plasma cells.
g) Write in short applications of the Flow cytometry.
h) Define Serology.

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

a) Write in details about types of vaccines.
b) Describe in detail about Agglutination.
c) Give a detailed account of mechanism of graft rejection.
d) Write in detail about HLA typing.

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

a) Describe in detail about structure of MHC Class II Molecule.
b) Define Cytokines and write in detail about their properties.
c) Define immunoglobulins and write in detail properties of IgM and draw its structure.

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

a) Give a detailed account of mechanism of Immunological Tolerance.
b) Describe in detail about ELISA.
c) Describe in detail about Myasthenia Gravis and Rheumatoid arthritis.

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Seat No.	

Set P

M.Sc. (Microbiology) (Semester - IV) (New) (NEP CBCS) Examination: October/November - 2025
Food and Dairy Microbiology (2316401)

Day & Date: Tuesday, 28-10-2025 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) Aflatoxicosis is caused by ____.
a) Aspergillus flavus b) Streptococcus pyogenes
c) Brucella abortus d) Salmonella enteritidis

2) ____ is an important antimicrobial substance present in milk.
a) Lactoferrin b) Antibiotic
c) Casein d) Lactose

3) Gerber method is used to determine ____ content in milk.
a) Casein b) Lactose
c) Fat d) Minerals

4) 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

5) 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

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

7) The production of blue discoloration in milk by is caused by ____.
a) *Pseudomonas syncyanea*
b) *Pseudomonas synxantha*
c) *Pseudomonas aeruginosa*
d) *Pseudomonas putida*

8) Rennet is used in production of ____.
a) Yoghurt b) Cheese
c) Dahi d) Kefir

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

1) ____ is pasteurization temperature for HTST.
2) The long form of FSSAI is ____.
3) Kumiss is not a fermented milk product. (True/False)
4) Botulism is an example of food poisoning. (True/False)

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

a) Define milk and give composition of Milk.
b) Define Food adulteration with examples.
c) Enlist types of Yoghurt.
d) Explain food additives.
e) Explain food spoilage.
f) what is FSSAI? Explain its role.
g) Explain Phosphatase test and its significance.
h) Define food preservatives.

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

a) Explain principles of food preservation and food preservation by low temperature.
b) Define fermented milk products. Explain Kumiss.
c) Write a note on spoilage of milk products.
d) Explain Dye reduction tests.

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

a) Describe fermented food products with examples.
b) Write a note on bacterial food intoxications.
c) Define pasteurization and various methods of pasteurization.

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

a) Describe in detail about various sources of contamination of milk.
b) Describe quality and safety assurance in food and dairy industry.
c) What are various types of cheese? Explain production of cheddar cheese.

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Seat No.	

Set P

M.Sc. (Microbiology) (Semester - IV) (New) (NEP CBCS) Examination: October/November - 2025
Molecular Biology and Genetic Engineering (2316402)

Day & Date: Thursday, 30-10-2025 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.
3) Draw neat labeled diagrams wherever necessary.

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

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

2) Which enzyme joins DNA fragments by forming phosphodiester bonds?
   a) Restriction enzyme b) DNA polymerase
   c) DNA ligase d) Kinase

3) The Ti plasmid is commonly used in _____.
   a) Bacterial transformation
   b) Plant genetic engineering
   c) Fungal transformation
   d) Viral vector construction

4) FISH stands for _____.
   a) Fluorescent In situ Hybridization
   b) Fluorescent Internal Synthesis of Hybrid
   c) Final In Situ Hybrid
   d) Fluorescence Internal Sequence Hybridization

5) pBR322 is a type of _____.
   a) Shuttle vector b) Plasmid vector
   c) Phage vector d) Cosmid

6) What is the function of Klenow fragment?
   a) DNA methylation b) Ligation of DNA
   c) Filling in 5’ overhangs d) Cleaving DNA

7) Which technique is used for high-throughput gene expression analysis?
   a) Microarray b) PCR
   c) RAPD d) FISH

8) Metabolic flux analysis is useful for _____.
   a) Cloning b) Protein expression
   c) Pathway optimization d) PCR

B) Fill in the Blanks: **04**

1) For Cloning of Large DNA Fragments _____ type of bacterial vector is used.
2) _____ library includes only expressed genes.
3) _____ enzyme adds phosphate groups to DNA.
4) RFLP stands for _____.

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

a) Define microsatellite repeats?
b) What is a cosmid vector.
c) Define microarray and mention one of its applications.
d) What is the purpose of using DNA linkers in cloning?
e) What are the advantages of Real-time PCR over conventional PCR?
f) Name two applications of fluorescence in situ hybridization (FISH)
g) What are the essential features of a good cloning vector.
h) Mention any two applications of genomic libraries.

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

a) Discuss any two methods of gene transformation.
b) Explain the process and applications of Southern blotting.
c) Explain the process and significance of DNA footprinting.
d) Differentiate between BAC and YAC.

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

a) Define Protein Engineering and discuss protein engineering strategies with examples.
b) Write a note on RFLP.
c) Define Gene therapy and explain in short its approach and examples.

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

a) Describe Sanger (Chain Termination Method) DNA sequencing methods and their significance.
b) Describe the role of restriction enzymes with examples.
c) Define Metabolic Engineering and discuss in short essence of metabolic engineering with examples.

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Seat No.		Set	P

M.Sc. (Microbiology) (Semester - IV) (New) (NEP CBCS) Examination: October/November - 2025
Agricultural Microbiology (2316405)

Day & Date: Saturday, 01-11-2025 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) Haploid plants can be obtained from ____ culture.
   a) Bud b) Leaf
   c) Root d) Anther

2) ____ is not used as biofertilizer.
   a) Agrobacterium b) Mycorrhiza
   c) Nostoc d) Rhzibium

3) ____ is used as biopesticide.
   a) B. subfilis b) B. amylolyticas
   c) B. thuringiensis d) Escherichia

4) ____ carry out fixation of nitrogen symbiotically.
   a) Azotobacter b) Rhizobium
   c) Clostridium d) Nitromonas

5) ____ hormone regulates cell division and elongation in plants.
   a) Thyroid b) IAA
   c) Insulin d) Rhizoid

6) ____ is the region of soil in the vicinity of plant root.
   a) Rhizosphere b) Rhizoid
   c) Hemisphere d) D.zone

7) ____ is an example of transgenic plant.
   a) Jawar b) Wheat
   c) Potato d) Golden Rice

8) Pseudomonas, Bacillus and Micrococcus are some examples of ____ bacteria.
   a) Penicillin producing b) Phosphate solubilizing
   c) Nitrogen fixing d) Plant pathogenic

B) Give true or false: **04**

1) Azotobacter is symbiotic nitrogen fixer.
2) Earthworms are not involved in vermicomposting.
3) Mycorrhiza is association between Mycobacteria and Rhizobium.
4) Transgenic plants are harmful to human.

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

a) What is phyllosphere?
b) Give the use of Gibberelic acid.
c) What is transgenic plant?
d) What is siderophore?
e) What is nonsymbiotic nitrogen fixation?
f) What is green manure?
g) What is composting process?
h) What is biological control?

Q.3 Write Short Note. (Any Three) **12**

a) Plant Growth promoting bacteria.
b) Vermicomposting.
c) Biological proportion of soil.
d) Plant Growth hormones.

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

a) Write in detail plant tissue culture.
b) Describe in detail production of biofertilizer by using Rhizobium.
c) Describe in detail Carbon cycle in soil.

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

a) Describe in detail commercial production and applications of B. thuringiensis.
b) Write an essay on “Organic matter decomposition”.
c) Describe in detail Nitrogen cycle.

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Seat No.	

Set P

M.Sc. (Microbiology) (Semester - IV) (New) (NEP CBCS) Examination: October/November - 2025
Environmental Microbiology (2316406)

Day & Date: Saturday, 01-11-2025 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 sentence by choosing correct alternative. 08

1) MCRT is ____Time.
   a) Major cellulose retention
   b) Major cell residence
   c) Mutant cell retention
   d) Mean cell residence

2) The transfer of food energy from one trophic level to another trophic level in an ecosystem is known ____.
   a) Food Chain b) Food web
   c) Trophic structure d) Pyramid

3) The addition of bacterial formulations externally to the waste water treatment is known as _____.
   a) Bioleaching b) Bioaugmentation
   c) Bioventing d) Biostimulation

4) The ISI tolerance limit of BOD for industrial effluent discharged into public sewer is ____ mg/L.
   a) 30 b) 50
   c) 250 d) 500

5) Activated sludge process usually employs an aeration period of ____.
   a) 1 hour b) 24 hours
   c) 10-15 hours d) 4-8 hours

6) ____ plant is used for phytoremediation.
   a) Derxia b) Reed
   c) Aquafena d) Fern

7) ____ enzymes are important in pollution control.
   a) Amylases b) Monooxygenase
   c) Proteases d) Deaminases

8) Highly alkaline pH is the characteristic feature of ____ waste.
   a) Paper and pulp b) Diary
   c) Sugar d) Textile mill

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

1) HRT is Hydraulic Retention Time. True/ False
2) Methane gas is produced in large amount during anaerobic sludge digestion True/False.
3) The waste water generated by ____ industry is called spent wash.
4) ____ gas is mainly responsible for greenhouse effect.

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

a) Define bioaugmentation.
b) Explain hazardous waste and its types.
c) Explain F/M ratio and HRT.
d) Treatment of distillery industry waste.
e) BOD and COD.
f) Define Acid rain.
g) Explain root zone process.
h) What is treatability test?

Q.3 Write Short Note. (Any Three) **12**

a) Write short note on ecological pyramids.
b) Write a note on Food chain and food webs.
c) Write a note on Pollution control bodies.
d) Write a note on environmental Audit.

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

a) Sources, effects and control of eutrophication.
b) Environmental impact assessment.
c) Explain waste water treatment by vermicomposting.

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

a) Write a note on Pollution control bodies.
b) Write a note on types of bioreactors.
c) Give an account of introduction, types of biological treatment processes.

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Seat No.	

Set P

M.Sc. (Microbiology) (Semester - IV) (New/Old) (CBCS) Examination: October/November - 2025
Pharmaceutical Microbiology (MSC023401)

Day & Date: Tuesday, 28-10-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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

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

1) ____ 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

2) ____ 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*

3) ____ of the following is frequently used as an antimicrobial preservative in ophthalmic reparation.
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) Sulphonamide act by inhibiting ____.
a) Protein Synthesis b) Cell Wall Synthesis
c) Folic Acid Synthesis d) DNA replication

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

7) ____ of the following is not involved in the regulatory practices for pharmaceuticals products.
a) FDA b) WHO
c) ISO d) NASA

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 above

9) ____ of the following is a peptide antibiotic.
a) Tetracycline b) Amoxicillin
c) Chloramphenicol d) Bacitracin

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

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

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

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

a) Write in detail about How antibiotics penetrate bacterial defenses and reach their intracellular targets.
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 Sterility testing and its importance in pharmaceutical production.

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

a) Describe in detail about Mode of action of bacterial killing by Quinolinone.
b) Describe in detail about multivalent subunit vaccines.

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

a) Describe in detail spoilage of pharmaceutical products (Sterile injectables).
b) Write in detail about different types of chemical disinfectants and their applications in pharmaceutical industry.

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

a) Give a detailed account of Safety in the Microbiology Laboratory.

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

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Seat No.	

Set P

M.Sc. (Microbiology) (Semester - IV) (New/Old) (CBCS)
Examination: October/November – 2025
Principles of Bioinstrumentation and Techniques (MSC023403)

Day & Date: Saturday, 01-11-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Questions no. 1 & 2 are compulsory.
2) Attempt any Three Question from Q No.3 to Q No.7
3) Figures to the right indicate full marks.

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

1) With the use of ____ chromatic aberrations and other imperfections of the lenses are minimized.
   a) Lenses b) Mirrors
   c) Silts d) Diaphragm

2) ____ is the wavelength range of visible light of electromagnetic spectrum.
   a) 380 to 780mm b) 780 to 1080nm
   c) 380 to 780nm d) 380 to 1080nm

3) When more and more water is added in acidic solution, its Hydrogen ion concentration will ____.
   a) Increases b) Decreases
   c) Remain the same d) None of the above

4) Buffer solution resists any changes in pH this is because ____.
   a) acids and alkalis in these solutions are shielded from attack by other ions
   b) these give unionized acids or alkalis on reaction with added acids or alkali
   c) They have fixed values of pH
   d) Large excess of H^+ to OH^- ions

5) ____ of the following cannot be used as an adsorbent in column adsorption chromatography.
   a) Magnesium Oxide b) Silica Gel
   c) Activated alumina d) Potassium permanganate

6) Centrifugation is based on ___ principle.
   a) Sedimentation coefficient b) Filtration coefficient
   c) Evaporation coefficient d) Size reduction coefficient

7) Heavy metals can be analyzed by ____.
   a) Gas chromatography b) HPLC
   c) pH meter d) Atomic absorption

8) ____of the following technique can be used to determine the three-dimensional structure of protein.
   a) Radioimmunoassay b) Liquid Chromatography
   c) Mass spectroscopy d) X ray crystallography

9) ____ is a factor does not influence electrophoretic mobility.
   a) Molecular weight b) Shape of molecule
   c) Size of molecule d) Stereochemistry of molecule

10) Sodium Dodecyl sulfate (SDS) used in SDS PAGE is ____.
   a) An anionic detergent b) A cationic detergent
   c) A non-ionic detergent d) An anion exchanger

B) Fill in the blanks OR write true/false: **06**

1) In which type of chromatography, the stationary phase held in a narrow tube and mobile phase is forced through it under pressure ____.
2) Chromatography cannot be used to purify volatile substances. (True / False)
3) In HPLC the time taken for a particular compound to travel through the column to the detector is known as ____.
4) The technique of electrophoresis was developed by ____.
5) Agarose can be extracted from ____ sea weed.
6) APS added in SDS PAGE because ____.

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

a) Write short about properties and types of objectives used in microscopy.
b) Write brief note on Buffers.
c) Write a note on micrometry.
d) Describe in short about Thin Layer 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 agarose gel electrophoresis.

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 molecular Exclusion 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 Southern Blotting.

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

a) Write in detail about Principle, working and applications of the Fluorescence and Phase Contrast Microscopy.

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.

SLR-HP-21

Seat No.	

Set P

M.Sc. (Microbiology) (Semester - IV) (New/Old) (CBCS) Examination: October/November - 2025
Healthcare and Diagnostic Microbiology (MSC023409)

Day & Date: Tuesday, 04-11-2025 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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

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

1) Infection lasts from several weeks to several years is refereed as ____ infection.
a) Acute b) Cross
c) Chronic d) Focal

2) Normal flora synthesizes vitamin ____ in the intestine.
a) Vit. A b) Vit. B12
c) Vit. C d) Vit. E

3) For the diagnosis of typhoid ____ test is performed which is known as ____ test.
a) Widal, Precipitation b) VDRL, Precipitation
c) Widal, Agglutination d) VDRL, Agglutination

4) ____ is the medium of choice for the isolation of V. cholerae and is widely used worldwide.
a) TCBS b) Wilson and Blair's
c) Lowenstein-Jensen's d) Mannitol Salt Agar

5) Which bacteria cause Boil, furuncle and local abscess disease?
a) *Staphylococcus aureus*
b) *Salmonella typhi*
c) *Pseudomonas aeruginosa*
d) *Corynebacterium diphtheria*

6) One of the following is an infection caused by a sexually transmitted bacterium that infects both males and females.
a) AIDS b) Boils
c) Meningitis d) Gonorrhea

7) ____ is also called as hydatid worm or dog tapeworm.
a) *Taenia saginata*
b) *Ecchinococcus granulosus*
c) *Ascaris lumbricodes*
d) *Wucheraria bancrofti*

8) Who is responsible for Lymphatic filariasis or elephantiasis infections which is one of the major vector-borne diseases in sub-Saharan Africa?

a) *Taenia saginata* b) *Ecchinococcus granulosus*
c) *Ascaris lumbricodes* d) *Wucheraria bancrofti*

9) COVID-19 is a spherical or pleomorphic enveloped viruses containing ____.

a) single-stranded (positive-sense) RNA
b) double-stranded (positive-sense) RNA
c) single-stranded (positive-sense) DNA
d) double-stranded (positive-sense) DNA

10) ____ also known as black fungus disease causes in persons with weakened immune system because of a medication or other diseases.

a) Histoplasmosis b) Mucormycosis
c) Dermatophytosis d) Legionellosis

B) Fill in the blanks OR Write True/False **06**

1) ____ refers to the ability of a pathogen to spread in the host tissues after establishing infection.
2) Infectious diseases transmitted from animals to man are called as Zoonotic diseases. (True or False)
3) When a soluble antigen combines with its antibody, the antigen-antibody forms a complex, this reaction is known as ____.
4) Peptic ulcer is caused by *Salmonella typhi* bacteria. (True or False)
5) ____ is responsible for Lymphatic filariasis or elephantiasis infections which is one of the major vector-borne diseases in sub-Saharan Africa.
6) Physician-induced infections resulting from investigative, therapeutic, or other procedures is termed as Iatrogenic infection. (True or False)

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

a) Describe factors in development of infection.
b) What are recent advances in detection of *M. Tuberculosis?*
c) Write on symptoms, laboratory diagnosis, prophylaxis, treatment of Diphtheria.
d) Explain Mucormycosis with respect to etiology, clinical manifestations, laboratory diagnosis and treatment.

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

a) Explain stages of clinical infections and types of infections.
b) Give the General guidelines of specimen collection.

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

a) Write on Normal flora of Digestive and Reproductive system with significance.

b) What are recent advances in diagnosis of *Leishmaniasis* and *Trepanosoma* cruzi?

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

a) Describe Pseudomonas infections with respect to etiological agent, mode of transmission, symptoms, epidemiology, laboratory diagnosis, prophylaxis and treatment.

b) Write on *Entamoeba histolytica* infection with respect to etiological agent, mode of transmission, symptoms, laboratory diagnosis, prophylaxis, treatment.

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

a) Describe meningitis with respect to etiological agent, mode of transmission, symptoms, epidemiology, laboratory diagnosis, prophylaxis and treatment.

b) Write on *Wucheraria bancrofti* infection with respect to etiological agent, mode of transmission, life cycle of parasite, symptoms, laboratory diagnosis, prophylaxis, treatment.

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

a) Explain Covid-19 virus disease with respect to structure of virus, clinical manifestations, transmission, laboratory diagnosis, prophylaxsis and treatment.

b) Explain Polio disease with respect to structure of virus, clinical manifestations, transmission, laboratory diagnosis, prophylaxsis and treatment.

SLR-HP-3

Seat No.	

Set P

M.Sc. (Microbiology) (Semester - I) (New) (NEP CBCS) Examination: October/November – 2025
Diagnostic Microbiology (2316107)

Day & Date: Wednesday 26-11-2025 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) High risk microbes are handled at laboratory having level _____.
a) BSL-1 b) BSL-2
c) BSL-3 d) BSL-4

2) _____ is clinical specimen used for diagnosis of respiratory tract infections.
a) Throat swab b) Vrine
c) Stool d) Blood

3) Peptic ulcer is caused by _____.
a) H. Pylori b) E. coli
c) Herpes virus d) Ps.aeruginosia

4) _____ commonly found on skin of human body.
a) E. coli b) B. subtilis
c) S. aureus d) V. cholerae

5) Rubella is also known as _____.
a) Gonorrhoea b) German measles
c) Hydrophobia d) Mad diseases

6) If there is delay for investigation, clinical specimens are preserved at _____ temperature.
a) -40^{0c} b) 25^{0c}
c) 4^{0c} d) 37^{0c}

7) _____ Might help human body maintain a healthy community of microorganism.
a) Antibiotics b) Antiseptics
c) Drugs d) Probiotics

8) Ascariasis is caused by _____.
a) Bacteria b) Viruses
c) Protozoa d) fungi

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

1) Incubator is another name of biosafety cabinet.
2) CSF is used for diagnosis of diseases of brain and spinal chord.
3) E. coli is normally present in intestine of human being.
4) Mycobacterium is used as probiotic.

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

a) Define clinical sample.
b) Which disease is caused by B. coli?
c) What is meaning of etiological agent?
d) Give the two examples of probiotics.
e) What is function of biosafety cabinet.
f) What is biohazardous waste?
g) What is meaning of incineration?
h) What is transport medium?

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

a) Disinfection of biohazardous waste.
b) Collection of blood.
c) Pathogenesis of H.pylori.
d) Transmission of Herpes virus.

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

a) Describe in detail good microbiological laboratory practices.
b) Describe in detail Leptospirosis.
c) Describe in detail probiotics therapy.

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

a) Describe in brief collection and transportation of clinical sample.
b) Write an essay on Biosafety cabinet.
c) Describe in Balantidiasis.