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Set **P**

**M.Sc. (Biotechnology) (Semester - I) (New) (NEP CBCS)  
Examination: March/April – 2026  
Biochemistry and Enzymology (2311101)**

Day & Date: Friday, 17-04-2026  
Time: 03:00 PM To 05:30 PM

Max. Marks: 60

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

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

- 1) End product of glycolysis is \_\_\_\_\_.
  - a) Glucose
  - b) Pyruvic Acid
  - c) Citric Acid
  - d) Glycogen
- 2) The synthesis of glucose from fat is called \_\_\_\_\_.
  - a) Glycolysis
  - b) Krebs cycle
  - c) Saponification
  - d) Gluconeogenesis
- 3) Oxidative phosphorylation results in the formation of \_\_\_\_\_.
  - a) Oxygen
  - b) ADP
  - c) ATP + H<sub>2</sub>O
  - d) NADH
- 4) Noncyclic photophosphorylation uses \_\_\_\_\_ photosystems.
  - a) 2
  - b) 3
  - c) 4
  - d) 1
- 5) Holoenzyme is made of \_\_\_\_\_.
  - a) Apoenzyme and Zymogen
  - b) Apoenzyme and Co-enzyme
  - c) Co-enzyme and Prosthetic group
  - d) Prosthetic group and Co-factor
- 6) Ribozymes are \_\_\_\_\_.
  - a) RNA acting as enzymes
  - b) Protein acting as enzymes
  - c) Ribose sugar acting as enzymes
  - d) Antibodies acting as enzymes
- 7) Which of the following enzyme inhibitions shows decreased Km Value?
  - a) Competitive inhibition
  - b) Un-competitive inhibition
  - c) Non-competitive inhibition
  - d) Feed back inhibition

- 8) Enzymes bringing about hydrolysis of esters and peptides are \_\_\_\_.
- a) Transferases
  - b) Lyases
  - c) Hydrolases
  - d) All of the above

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

- 1) Glucose is converted into Glucose-6-Phosphate by hexokinase
- 2) Oxygen functions as the source of electrons in photosynthesis.
- 3) A Lineweaver-Burk plot is a graph that shows enzyme kinetics.
- 4) During the transition state, an enzyme completely converts a substrate into a product.

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

- a) Enlist biomolecules with examples.
- b) Differentiate between photosystem I and II.
- c) Write function of rubisco enzyme.
- d) What is Activation energy?
- e) Write Clinical significance of enzymes.
- f) Define turnover number of an enzyme.
- g) Define enzyme activity.
- h) Draw a ring structure of any two monosaccharides.

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

- a) Define Biosensors and enlist their applications.
- b) Mention the significance of  $V_{max}$  and  $K_m$ .
- c) Write a note on Ramachandran plot.
- d) Write an account on immobilization of enzymes.

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

- a) Explain the pathway of TCA cycle.
- b) Derive the Michalis Menten equation and state significance of  $K_m$  and  $V_{max}$ .
- c) Describe the biochemical pathway of glycolysis. Comment on its regulation.

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

- a) Describe the reversible enzyme inhibition with respect to Lineweaver Burk plot.
- b) Outline the steps involved in the pentose phosphate pathway.
- c) Explain the endocrine system and mention all hormones in human body.

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Set **P**

**M.Sc. (Biotechnology) (Semester - I) (New) (NEP CBCS) Examination:  
March/April – 2026  
Cell and Molecular Biology (2311102)**

Day & Date: Monday, 20-04-2026  
Time: 03:00 PM To 05:30 PM

Max. Marks: 60

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

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

- 1) Which of the following enzymes separates the two strands of DNA during replication?
  - a) Gyrase
  - b) Topoisomerase
  - c) Helicase
  - d) DNA polymerase
- 2) What is the first step in the process of DNA replication?
  - a) Synthesis of new DNA strands
  - b) Unwinding of the DNA double helix
  - c) Formation of Okazaki fragments
  - d) Ligation of DNA fragments
- 3) Which of the following is incorrect with respect to mutation?
  - a) Sudden
  - b) Continuous
  - c) Change in chromosomes and genes
  - d) Leads to variation in DNA
- 4) During replication, Okazaki fragments elongate \_\_\_\_\_.
  - a) leading strand towards the replication fork
  - b) lagging strand towards the replication fork
  - c) leading strand away from the replication fork
  - d) lagging strand away from the replication fork
- 5) Which of the following cell organelles is called a suicidal bag?
  - a) Lysosomes
  - b) Golgi bodies
  - c) Cell membrane
  - d) Mitochondria
- 6) Hershey and Chase used radioactive \_\_\_\_\_ to label the DNA core of the bacteriophage.
  - a) Phosphorous
  - b) nitrogen
  - c) carbon
  - d) sulfur
- 7) The structure of the cell that controls the cell's activities is \_\_\_\_\_.
  - a) Ribosomes
  - b) Cytoplasm
  - c) Nucleus
  - d) Golgi body

- 8) \_\_\_\_\_ is the correct definition of excision repair.
- Repair of a single damaged nucleotide
  - Repair of a damaged oligonucleotide
  - Removal of a single damaged nucleotide
  - Removal of a damaged oligonucleotide.

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

- Sickle cell anemia is a classic example of point mutation.
  - True
  - False
- Mutagens can cause permanent damage to genetic material.
  - True
  - False
- Cell organelle nucleus is called the powerhouse of the cell.
  - True
  - False
- The discontinues strand of DNA is called leading strand.
  - True
  - False

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

- What is photoreactivation.
- Enlist the different enzymes involved in replication.
- Write note on repetitive DNA.
- Write a note on function of cytoskeleton.
- What are the different types of DNA repair?
- Explain the term Satellite DNA.
- Write a note on function of Cell organelles.
- Explain the term genetic code.

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

- Write a note on SOS repair mechanism.
- What are the main points of cell theory?
- Explain the terms Heterochromatin and Euchromatin.
- Write a note on different enzymes involved in Prokaryotic & eukaryotic Transcription.

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

- Describe different types of mutation.
- Explain Avery-MacLeod and McCarty experiment.
- Describe in detail about the mechanism of eukaryotic transcription.

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

- Describe in detail the mechanism of DNA replication in eukaryotes.
- Write a note on Signal transduction pathway.
- What are cell adhesion molecules? Explain with an example.

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Set **P**

**M.Sc. (Biotechnology) (Semester - I) (New) (NEP CBCS) Examination:  
March/April - 2026  
Biostatistics and Bioinformatics (2311107)**

Day & Date: Wednesday, 22-04-2026  
Time: 03:00 PM To 05:30 PM

Max. Marks: 60

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

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

- 1) Secondary protein structure can be predicted by using \_\_\_\_\_.
  - a) SOPMA
  - b) ProtParam
  - c) SWISSMODEL
  - d) RasMol
- 2) BLAST is used for \_\_\_\_\_ alignment.
  - a) Global
  - b) local
  - c) Multiple
  - d) Global and local
- 3) The PubMed provides information of \_\_\_\_\_ Database.
  - a) Nucleotide
  - b) Protein
  - c) Genome
  - d) Literature
- 4) Which of the following is an example of a homology and similarity tool?
  - a) RasMol
  - b) BLAST
  - c) PROSPECT
  - d) EMBOS
- 5) \_\_\_\_\_ are the variations in a nucleotide sequence which occur due to change even single base.
  - a) ESTs
  - b) SNPs
  - c) STS
  - d) HTG
- 6) \_\_\_\_\_ tool is used construct dendrogram to study the evolutionary Relationship.
  - a) ClustalW
  - b) BLAST
  - c) MEGA
  - d) GOR
- 7) \_\_\_\_\_ is obtained by adding all the values and by dividing the total number of items.
  - a) Mean
  - b) Mode
  - c) Median
  - d) Correction
- 8) \_\_\_\_\_ is the measure of the variation of the items.
  - a) Central Tendency
  - b) Histogram
  - c) Score
  - d) Dispersion

- B) Write True /False. 04**
- 1) A null hypothesis is a statistical statement proposing that there is a significant difference, effect, or relationship between measured variables or population parameters.
  - 2) PHYLIP is a free package of programs for inferring secondary structure of protein.
  - 3) The DNA Data Bank of Japan (DDBJ) is maintained and operated by the Bioinformation and DDBJ Center at the National Institute of Genetics (NIG) in Mishima, Japan.
  - 4) Ramchandran plot can be used for Validation of 3-D protein structure.
- Q.2 Answer the following. (Any Six) 12**
- a) Write about Chi Square test.
  - b) Give names of search engines used in Bioinformatics.
  - c) What is the use of nucleotide sequence alignment?
  - d) Write about classification of the data.
  - e) What is molecular phylogeny?
  - f) Write applications of Bioinformatics.
  - g) Write about Ramchandran plot.
  - h) What is a standard deviation?
- Q.3 Answer the following. (Any Three) 12**
- a) Write a note on Probability.
  - b) Write an account on 'Hypothesis testing'.
  - c) Describe the terms genomics and proteomics.
  - d) Write a note on in silico primer designing.
- Q.4 Answer the following. (Any Two) 12**
- a) Describe protein structure prediction using bioinformatics tools.
  - b) Describe the NCBI database and its applications.
  - c) Describe pairwise sequence alignment using BLAST and FASTA.
- Q.5 Answer the following. (Any Two) 12**
- a) Write an account on Biological Databases.
  - b) Describe RasMol and PyMol as structure visualization tools.
  - c) Write a note on types of phylogenetic trees and tools for phylogenetic analysis.



- B) Fill in the blank. 04**
- 1) The colour of the nano gold particles is \_\_\_\_\_.
  - 2) \_\_\_\_\_ first used the term Nanotechnology.
  - 3) The biological response of the biosensor is determined by \_\_\_\_\_.
  - 4) Nano sized polymers built from branched units are called \_\_\_\_\_.

- Q.2 Answer the following. (Any Six) 12**
- a) Define Nanoparticle.
  - b) Define Nanofabrication.
  - c) Define Nano biosensor.
  - d) Define Nanotube.
  - e) Define Biogenic.
  - f) Write a short note on Spray pyrolysis.
  - g) Write a short note on self-assembly technique.
  - h) Write a short note on intracellular compartmentation.

- Q.3 Answer the following. (Any Three) 12**
- a) Explain characterization of nanomaterial synthesis.
  - b) Explain Active efflux.
  - c) Explain Plasma method.
  - d) Explain Arc Discharge technique.

- Q.4 Answer the following. (Any Two) 12**
- a) Write a note on recent advances in nanocomposites.
  - b) Write a note on Chemical Vapor Deposition.
  - c) Write a note on Mechanical Milling method.

- Q.5 Answer the following. (Any Two) 12**
- a) What is nanomaterial? Explain in details its production by biogenic methods.
  - b) What is nanocomposite? Explain in details its properties and applications.
  - c) Explain in details Gas phase Synthesis of Nano powders.

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Set **P**

**M.Sc. (Biotechnology) (Semester - I) (New) (NEP CBCS) Examination:  
March/April – 2026  
Plant breeding and Tissue Culture (2311109)**

Day & Date: Wednesday, 22-04-2026  
Time: 03:00 PM To 05:30 PM

Max. Marks: 60

- Instructions:** 1) All questions are compulsory.  
2) Draw neat diagram and give equations wherever necessary.  
3) Figures to the right indicate full marks.  
4) Use of logarithmic table and calculator is allowed.  
(At. Wts.: H=1, C=12, O=16, N=14, Na=23, Cl=35.5)

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

- 1) \_\_\_\_\_ is the primary method for isolating protoplasts.
  - a) Enzymatic digestion of the cell wall
  - b) Electrical stimulation to remove the cell wall
  - c) Mechanical disruption only
  - d) Chemical treatment to break the plasma membrane
- 2) \_\_\_\_\_ is an example of biotransformation using plant cell culture.
  - a) Synthesizing nucleic acids for growth
  - b) Converting digitoxin into digoxin.
  - c) Converting sugar into biomass
  - d) Producing chlorophyll from precursors
- 3) \_\_\_\_\_ is a key concept in the Law of Homologous Series.
  - a) Survival of the fittest
  - b) Parallel variation in related taxa
  - c) Punctuated equilibrium
  - d) Inheritance of acquired characteristics
- 4) The common example of a transgenic crop engineered for resistance to biotic stress is \_\_\_\_\_.
  - a) Herbicide-tolerant soybean
  - b) Flavr Savr Tomato
  - c) Bt Cotton
  - d) Golden Rice
- 5) The process of expression of foreign genes in a plant is called \_\_\_\_\_.
  - a) Cell hybridization
  - b) Transgenesis
  - c) Gene expression
  - d) Genetic transformation
- 6) A method of selection useful for self-pollinated plants is \_\_\_\_\_.
  - a) Pureline selection
  - b) Random selection
  - c) Mass selection
  - d) Progeny selection

- 7) The correct sequence of steps in mutation breeding is \_\_\_\_\_.  
 a) Mutagenesis → Selection → Evaluation → Selfing (for self-pollinated crops).  
 b) Selection → Mutagenesis → Selfing → Evaluation  
 c) Evaluation → Mutagenesis → Selection → Selfing  
 d) Selfing → Mutagenesis → Evaluation → Selection
- 8) A key genetic mechanism for developing heat-tolerant crops involves the overexpression of \_\_\_\_\_ proteins.  
 a) Aquaporins  
 b) Abscisic acid (ABA) receptors  
 c) Heat shock proteins (HSPs)  
 d) Glycine betaine

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

- 1) Somaclonal variation occurs in plants regenerated from \_\_\_\_\_.  
 2) \_\_\_\_\_ molecular breeding technique is most suitable for improving a quantitative trait controlled by many minor genes.  
 3) Cybrids are produced by fusing a normal cell with a \_\_\_\_\_.  
 4) In meristem culture \_\_\_\_\_ part of the plant is used as the explant.

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

- a) Artificial Seed  
 b) Elicitation  
 c) MARS Molecular marker  
 d) Ideotype breeding  
 e) Abiotic Stress Tolerance  
 f) Gametoclonal variation  
 g) Hairy root culture  
 h) Transgenic crops

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

- a) Explain about metabolic engineering for production of secondary metabolites.  
 b) Write a detailed note on Mutation breeding.  
 c) Discuss about Virus-free plants by meristem culture.  
 d) Write a note on somaclonal variation.

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

- a) Discuss in detail about Protoplast culture and fusion.  
 b) Explain about Endosperm culture and triploid production.  
 c) Write a detailed note on Cryopreservation.

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

- a) Define Molecular markers and add a note on Role of molecular markers in stress resistance breeding with suitable example.  
 b) Discuss in detail about Organogenesis and Somatic embryogenesis.  
 c) Write a detailed note on Preservation of plant germplasm in-vitro.

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Set **P**

**M.Sc. (Biotechnology) (Semester - I) (New) (NEP CBCS) Examination:  
March/April - 2026  
Research methodology (2311103)**

Day & Date: Friday, 24-04-2026  
Time: 03:00 PM To 05:30 PM

Max. Marks: 60

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

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

**08**

- 1) The data acquired from the internet or medical record is \_\_\_\_\_ data.
  - a) Primary
  - b) Qualitative
  - c) Ordinary
  - d) Secondary
- 2) What is the function of a post-test in ANOVA?
  - a) Determine if any statistically significant group differences have occurred
  - b) Describe those groups that have reliable differences between group means
  - c) Set the critical value for the F test (or chi-square)
  - d) None of the above
- 3) Which technique is generally followed when the population is finite?
  - a) Area Sampling Technique
  - b) Purposive Sampling Technique
  - c) Systematic Sampling Technique
  - d) None of the above
- 4) A Research is a \_\_\_\_\_.
  - a) Lab experiment
  - b) systematic and scientific inquiry
  - c) Report
  - d) procedure
- 5) A subset that is chosen from large population?
  - a) Parameter
  - b) Variable
  - c) Sample
  - d) Statistic
- 6) Bibliography given in a research report \_\_\_\_\_.
  - a) shows vast knowledge of the researcher
  - b) helps those interested in further research
  - c) has no relevance to research
  - d) All the above



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Set **P**

**M.Sc. (Biotechnology) (Semester - II) (New) (NEP CBCS)  
Examination: March/April – 2026  
Microbiology and Microbial Techniques (2311201)**

Day & Date: Thursday, 16-04-2026  
Time: 11:00 AM To 01:30 PM

Max. Marks: 60

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

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

- 1) Peptidoglycan is a component of \_\_\_\_\_.
  - a) flagella
  - b) cell membrane
  - c) cell wall
  - d) capsule
- 2) \_\_\_\_\_ bacteria appear purple-violet colored after Gram staining.
  - a) Gram-positive
  - b) Gram-negative
  - c) Both Gram-positive and Gram-negative
  - d) Neither Gram-positive nor Gram-negative
- 3) The protein coat of viruses that enclose the genetic material is called \_\_\_\_\_.
  - a) Virion
  - b) Capsid
  - c) Peplomers
  - d) Capsomers
- 4) Algae and fungi have a symbiotic relationship called \_\_\_\_\_.
  - a) Antifungal
  - b) Slime mold
  - c) Lichen
  - d) Mycology
- 5) \_\_\_\_\_ is known as the father of Microbiology.
  - a) Edwin John Butler
  - b) Ferdinand Cohn
  - c) Robert Koch
  - d) Antoni van Leeuwenhoek
- 6) In capsule staining by Maneval's method, Maneval's solution is prepared by using a mixture of acid fuchsin and \_\_\_\_\_.
  - a) Acetic acid
  - b) Carboic acid
  - c) Citric acid
  - d) Butyric acid
- 7) For isolation of microorganism by spread plate technique \_\_\_\_\_ is used.
  - a) Nichrome wire loop
  - b) Iron wire loop
  - c) Cotton swab
  - d) Forceps

- 8) ATCC stands for \_\_\_\_\_.
- Asian Type Culture Collection
  - American Type Culture Collection
  - Agricultural Type Culture Collection
  - Automatic Type Culture Collection

**B) Write True /False.**

**04**

- The primary stain used in Gram's staining is Safranin.
- Autoclave is used for steam sterilization.
- Escherichia coli* is found in the intestines of humans as normal flora.
- Cell wall is negatively charged.

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

**12**

- Define Taxonomy.
- Write the difference between a broth and Agar.
- Define Viruses and give any two examples.
- What are Extremophiles? Write any two examples.
- Write principle of negative staining.
- Explain principle of Fungal staining.
- Write industrial application of Algae.
- Give the role of components used in Gram's staining procedure.

**Q.3 Write short notes of the following. (Any Three)**

**12**

- Write a note on Physical, Chemical and Mechanical method of sterilization.
- Write a note reproduction of Fungi.
- Explain in detail about distribution of microorganisms in air, soil and water.
- Define Differential staining and explain its principle and mechanism

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

**12**

- Explain in detail about Major Bacterial culture collection units.
- Write general characters of Thermophiles and Halophiles and write their applications.
- Write a note on maintenance and preservation of pure cultures.

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

**12**

- Write a note on history and scope of Microbiology.
- Describe the isolation of microorganisms by using various techniques.
- Explain in detail Pathogenesis and Industrial applications of slime molds and protozoan's.

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Set **P**

**M.Sc. (Biotechnology) (Semester - II) (New) (NEP CBCS)  
Examination: March/April – 2026  
Immunology and Immuno techniques (2311202)**

Day & Date: Saturday, 18-04-2026  
Time: 11:00 AM To 01:30 PM

Max. Marks: 60

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

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

- 1) Host defenses that are mediated by T cells following exposure to antigen known as \_\_\_\_\_ immune response.
  - a) Cell mediated
  - b) Native
  - c) Innate immunity
  - d) MALT
- 2) \_\_\_\_\_ is a secondary lymphoid organ where blood-borne antigens are trapped.
  - a) Thymus
  - b) Bone marrow
  - c) Spleen
  - d) lymph node
- 3) \_\_\_\_\_ is the strength of binding interaction between an epitope of an antigen and an antigen binding site of an antibody.
  - a) Affinity
  - b) Avidity
  - c) Complement fixation
  - d) ADCC
- 4) \_\_\_\_\_ is a group of genes encoding cell-surface molecules that are required for antigen presentation to T cells and for rapid graft rejection.
  - a) MHC
  - b) CD
  - c) FADD
  - d) FAS
- 5) \_\_\_\_\_ is the complex of complement components C5-C9, which mediates cell lysis by creating a membrane pore in the target cell.
  - a) C3 convertase
  - b) Lysozyme
  - c) Isozyme
  - d) Membrane Attack Complex
- 6) The attribute of a single cytokine can elicit multiple diverse biological effects on different cell types is known as \_\_\_\_\_.
  - a) pleiotropy
  - b) redundancy
  - c) synergy
  - d) antagonism
- 7) \_\_\_\_\_ is a state of immunologic unresponsiveness to particular antigens or sets of antigens.
  - a) Allergy
  - b) Energy
  - c) Tolerance
  - d) hypersensitivity



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Set **P**

**M.Sc. (Biotechnology) (Semester - II) (New) (NEP CBCS)  
Examination: March/April – 2026  
Inheritance Biology (2311207)**

Day & Date: Tuesday, 21-04-2026  
Time: 11:00 AM To 01:30 PM

Max. Marks: 60

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

**Q.1 A) Multiple choice questions:****08**

- 1) Females have a part of identical sex chromosome called X chromosomes hence they are called as \_\_\_\_\_.
  - a) Homomorphic
  - b) Heteromorphic
  - c) Automorphic
  - d) Gynandromorphic
- 2) The Ideal DNA markers for genetic mapping and population studies are \_\_\_\_\_.
  - a) Minisatellite
  - b) Microsatellite
  - c) LINES
  - d) SINES
- 3) Gene Interaction that involves the marking of the gene effect is \_\_\_\_\_.
  - a) supplementary genes
  - b) complementary genes
  - c) epistasis
  - d) Pleiotropy
- 4) The term organic evolution was coined by \_\_\_\_\_.
  - a) Spencer H.
  - b) Oparin A.I
  - c) Aristotle
  - d) Plato
- 5) Minisatellites are located near \_\_\_\_\_.
  - a) Centromeres
  - b) Chromosomes
  - c) Telomers
  - d) Acromeres
- 6) Drosophila is a suitable model because it has \_\_\_\_\_.
  - a) Short generation time
  - b) Complex genome
  - c) No sexual dimorphism
  - d) Cannot be cultured
- 7) The F factor in bacteria is responsible for \_\_\_\_\_.
  - a) Transformation
  - b) Conjugation
  - c) Transduction
  - d) Recombination
- 8) Hardy Weinberg equilibrium assumes \_\_\_\_\_.
  - a) No mutation
  - b) Small population
  - c) Natural selection
  - d) High migration

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

- 1) Polyploidy is common in animals.
- 2) Genetic drift is more effective in large populations.
- 3) A property common to all types of Hetero-chromatins is late transcription.
- 4) The unit of measurement for genetic linkage is centimorgan.

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

- a) Define Test Cross.
- b) Define Hardy Hamberg equation.
- c) Define Transformation.
- d) Define Allele.
- e) Define Genotype.
- f) Define Euchromatin.
- g) Define Homologous organs.
- h) Define C- value paradox.

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

- a) Write about linkage and cross over with an example.
- b) Write about genetic mosaic in Drosophila.
- c) Write about transduction and its types.
- d) Write about structure of sex chromosomes.

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

- a) Describe numerical chromosomal changes with examples.
- b) Describe the process of conjugation in bacteria with neat diagram.
- c) Describe causes of changes in Gene Frequency.

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

- a) Explain concepts of extra chromosomal inheritance in chloroplast.
- b) Describe Drosophila as an Eukaryotic model.
- c) Describe the theory of Lamarckism with examples.

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Set **P**

**M.Sc. (Biotechnology) (Semester -II) (New) (NEP CBCS) Examination:  
March/April - 2026**

**Cancer Genetics and Animal Tissue Culture (2311209)**

Day & Date: Tuesday, 21-04-2026  
Time: 11:00 AM To 01:30 PM

Max. Marks: 60

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

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

**08**

- 1) Mutation in proto-oncogene results in: \_\_\_\_\_.
  - a) Cell cycle arrest
  - b) Activation of oncogene
  - c) Apoptosis
  - d) DNA repair
- 2) The spread of cancer cells from primary to secondary sites is called \_\_\_\_\_.
  - a) Angiogenesis
  - b) Metastasis
  - c) Hyperplasia
  - d) Dysplasia
- 3) The process of isolating cells from a tissue is called: \_\_\_\_\_.
  - a) Transformation
  - b) Disaggregation
  - c) Transduction
  - d) Filtration
- 4) Primary culture refers to: \_\_\_\_\_.
  - a) Cell lines from a single clone
  - b) Culture obtained directly from tissues
  - c) Immortalized cell lines
  - d) Frozen cell storage
- 5) \_\_\_\_\_ is not a Hallmarks of cancer cell.
  - a) sustaining proliferative signaling
  - b) evading growth suppressors
  - c) resisting cell death
  - d) controlled cell division
- 6) p53 is capable of binding to which family of proteins?
  - a) Bcl-1
  - b) Bcl-2
  - c) Bcl-3
  - d) Bcl-4
- 7) Which environmental factors can trigger changes in the epigenome?
  - a) Stress
  - b) Diet
  - c) Toxins
  - d) all these options

- 8) Which of the following techniques is commonly used to detect cancer in cervix and uterus?
- a) Biopsy
  - b) Endoscopy
  - c) Radiography
  - d) PCR

- B) Write True /False. 04**
- 1) Anchorage dependent cells require substrate to attach with.
  - 2) Serum free media does not require protease inhibitor.
  - 3) The expression of telomerase on cancer cells can be considered an epigenetic change.
  - 4) Oncogenes promote apoptosis of cancer cells.

- Q.2 Answer the following. (Any Six) 12**
- a) Differentiate between normal cells and cancer cells.
  - b) Describe the mechanism of apoptosis in brief.
  - c) Define metastasis.
  - d) Enlist Tumor suppressor genes.
  - e) Define Epigenetics.
  - f) What are retroviral drugs?
  - g) Write about the advantages of animal cell culture.
  - h) Mention the methods of Disaggregation of tissue.

- Q.3 Answer the following. (Any Three) 12**
- a) Describe the hallmarks of cancer cells in detail with suitable examples.
  - b) Discuss tumor suppressor genes and their role in cancer prevention (p53, pRb, BRCA).
  - c) Explain the mechanisms and pathways of apoptosis and its significance in cancer therapy.
  - d) Explain role of serum in cell culture.

- Q.4 Answer the following. (Any Two) 12**
- a) Describe metastasis - clinical significance of invasion, proteinases, and basement membrane disruption.
  - b) Discuss methods of cancer diagnosis and treatment with emphasis on immunotherapy.
  - c) Write in detail about basic techniques in animal cell culture.

- Q.5 Answer the following. (Any Two) 12**
- a) Describe various types of animal tissue culture. What are advantages of animal cell culture?
  - b) Explain in detail Regulation of Cell cycle and Tumor suppressor genes.
  - c) Discuss the Factors activating proto-oncogene to oncogene.





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Set **P**

**M.Sc. (Biotechnology) (Semester - III) (New) (NEP CBCS)**  
**Examination: March/April - 2026**  
**Genetic Engineering (2311302)**

Day & Date: Monday, 20-04-2026  
 Time: 11:00 AM To 01:30 PM

Max. Marks: 60

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Draw neat diagrams and give equations wherever necessary.  
 4) Use of logarithmic table and calculator is allowed.  
 (At. Wts.: H=1, C=12, O=16, N=14, Na =23, Cl = 35.5)

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

- 1) In gene therapy, \_\_\_\_\_ viral vectors are often used to deliver the human interferon gene.
  - a) Retrovirus
  - b) Baculovirus
  - c) Chloroplast DNA
  - d) Plasmid DNA
- 2) In \_\_\_\_\_ year the first recombinant Hepatitis B vaccine was created and approved for use in the US.
  - a) 1986
  - b) 1990
  - c) 1950
  - d) 1994
- 3) The inheritance pattern of RAPD is \_\_\_\_\_.
  - a) Dominant
  - b) Recessive
  - c) Co-dominant
  - d) Random
- 4) The genetic disease is defined by haemophilia is \_\_\_\_\_.
  - a) X-linked dominant inheritance
  - b) X-linked recessive inheritance
  - c) Autosomal dominant inheritance
  - d) Autosomal recessive inheritance
- 5) \_\_\_\_\_ is not required for DNA sequencing.
  - a) Polymerase chain reaction
  - b) Electrophoresis
  - c) Cloning
  - d) Restriction digestion
- 6) Genetic markers are used in animal breeding to \_\_\_\_\_.
  - a) To determine the age
  - b) Increase a lifespan of animal
  - c) Study genetic diversity in population
  - d) Improve selective breeding efficiency
- 7) The ability of \_\_\_\_\_ determines the nucleic acid hybridisation process.
  - a) Probes
  - b) Cell membrane
  - c) Vacuoles
  - d) Golgi apparatus

- 8) \_\_\_\_\_ endonuclease cleaves both single and double stranded DNA molecules, in a non-specific manner.
- a) S1
  - b) Bal31
  - c) BamHI
  - d) DNase I

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

- 1) Molecular scissors called restriction endonucleases can cut DNA at any random site.
- 2) Plasmid replication is independent on the host cell.
- 3) Baculovirus vectors cannot co-express multiple transgenes.
- 4) Nucleic acid probe must get attached to Complementary DNA strand.

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

- a) Add note on microarray.
- b) Define DNA sequencing.
- c) Describe exonuclease.
- d) Function of vector.
- e) Mention enzymes used in DNA Isolation.
- f) Write note on chromosomal walking.
- g) Add note on AFLP.
- h) Describe bacteriophage.

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

- a) Explain DNA fingerprinting in detail.
- b) Write a note on detection and diagnosis of sickle cell anemia and malaria.
- c) Add account on screening of recombinant cell.
- d) Add a brief note on nucleic acid modifying enzymes.

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

- a) Write in detailed note on PCR.
- b) Explain in detail about direct transformation methods.
- c) Describe in brief about construction and screening of c DNA library.

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

- a) Explain in detail about Sanger's di deoxy method.
- b) Describe DNA manipulating enzymes.
- c) Add account on transgenic sheep and mice.

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**M.Sc. (Biotechnology) (Semester - III) (New) (NEP CBCS)  
Examination: March/April – 2026  
Plant Biotechnology (2311306)**

Day & Date: Wednesday, 22-04-2026  
Time: 11:00 AM To 01:30 PM

Max. Marks: 60

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

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

- 1) \_\_\_\_\_ & \_\_\_\_\_ Cultured Anther and Pollen for haploid production.
  - a) Guha & Maheshwari
  - b) Miller & Skoog
  - c) Gautheret & Nobercourt
  - d) Caplan & Stewart
- 2) Somatic embryos are \_\_\_\_\_.
  - a) embryos developed from zygote after fertilization
  - b) embryos developed from egg without fertilization
  - c) embryo like structure developed from the cells of callus
  - d) embryo developed by ovules
- 3) Tissue culture technique was first practiced by \_\_\_\_\_.
  - a) White
  - b) Haberlandt
  - c) Halperin
  - d) Skoog
- 4) \_\_\_\_\_ are somaclones.
  - a) Plants chemically identical to the original plant
  - b) Plants morphologically identical to the original plant
  - c) Plants anatomically identical to the original plant
  - d) Plants genetically identical to the original plant
- 5) \_\_\_\_\_ is not related to embryo culture.
  - a) Growth of embryos on culture medium
  - b) Developing seedlings
  - c) Multiplication of rare plants
  - d) Making virus-free plants
- 6) \_\_\_\_\_ of the following is NOT a plant growth regulator.
  - a) Auxin
  - b) Polyphenols
  - c) Cytokinins
  - d) Abscisic acid
- 7) \_\_\_\_\_ is the method of maintaining a whole embryo or organ excised from the host organism in an artificial medium.
  - a) Organ culture
  - b) Explant culture
  - c) Horticulture
  - d) Cell culture

- 8) Cryopreservation means it is a process to preserve plant cells, tissue, or organ \_\_\_\_\_.
- At very low temperature by using ether
  - At very high temperature by using liquid nitrogen
  - At very low temperature of -196 by using liquid nitrogen
  - At very low temperature by using liquid nitrogen

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

- The culturing of undifferentiated plant cells and calli requires more of auxin and less of cytokinin.
- Trypsin is used for dissociating the tissue into single cells.
- Totipotent cells can give rise to embryo only.
- Cell density is one of the major factors influencing protoplast cultures.

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

- Define Organogenesis.
- Write a short note on hybrid plant.
- Define callus culture.
- Define virulence gene.
- Define edible vaccine.
- Define germplasm.
- Define somaclonal Variations
- Define micropropagation.

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

- Write a brief note on hairy root.
- Write a brief note on plant hormone.
- Write a brief note on plant secondary metabolites.
- Write a brief note on therapeutic proteins.

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

- What is protoplast? Explain in details its isolation, fusion and culture.
- Explain in details plant tissue culture lab set up.
- Explain in details haploid plant production.

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

- What is cryopreservation? Explain in details its method.
- What is transformation? Explain in details the DNA transfer techniques.
- What is plant biotechnology? Explain in details Enhancement of nutritional value of crop Plants & molecular farming.

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Set **P**

**M.Sc. (Biotechnology) (Semester - III) (New) (NEP CBCS)**  
**Examination: March/April – 2026**  
**Molecular Diagnostics (2311307)**

Day & Date: Wednesday, 22-04-2026  
 Time: 11:00 AM To 01:30 PM

Max. Marks: 60

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

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

- 1) The diffusion method for antimicrobial susceptibility testing is commonly known as: \_\_\_\_\_.
  - a) ELISA test
  - b) PCR test
  - c) Kirby-Bauer test
  - d) Immunofluorescence test
- 2) Which of the following techniques is used to detect antigen-antibody reactions using radioactivity?
  - a) Radioimmunoassay
  - b) Immunofluorescence
  - c) ELISA
  - d) PCR
- 3) Which of the following can be used to generate DNA fingerprints to detect genetic variation across the genome?
  - a) AFLP
  - b) AFM
  - c) AFP
  - d) AEMP
- 4) Which of the following is not a part of automated antimicrobial susceptibility testing?
  - a) MIC panel
  - b) Disc Reading
  - c) Laboratory Information System
  - d) Manual Reading and Interpretation
- 5) \_\_\_\_\_ are the specific parts of antigens that can trigger a targeted immune response.
  - a) Epitopes
  - b) Abzymes
  - c) Adjuvants
  - d) Granzymes
- 6) An anti-idiotypic antibody binds to \_\_\_\_\_ site of another antibody.
  - a) membrane
  - b) receptor
  - c) antigen binding
  - d) antibody binding
- 7) Which of the following is not a commonly used fluorochrome in immunofluorescence techniques?
  - a) Fluorescein
  - b) Phenylene
  - c) Rhodamine
  - d) Phycoerythrin

- 8) Which type of antibodies provides greater specificity in enzyme immunoassays?
- a) Polyclonal antibodies
  - b) Monoclonal antibodies
  - c) Humanized antibodies
  - d) Abzymes

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

- 1) RAPD is not a molecular marker technique.
- 2) PCR is used for amplification of DNA copies.
- 3) Fluorescence of a labelled molecule is reduced by quenching.
- 4) Container for disposal of biological waste should be leak proof.

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

- a) What is application of PCR in clinical microbiology?
- b) What is an epitope?
- c) What are monoclonal antibodies?
- d) Which solid phases can be used in enzyme immunoassays?
- e) Write application of nuclear hybridization methods.
- f) Give examples of molecular markers.
- g) Differentiate between Homogeneous and Heterogeneous enzyme immunoassays.
- h) What are the requirements of a radioimmunoassay?

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

- a) Write a note on molecular estimation of protein.
- b) Write a note on single nucleotide polymorphism.
- c) Describe enzyme immunohistochemical techniques.
- d) Quality control methods and maintenance of laboratory records.

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

- a) Discuss use of monoclonal and polyclonal antibodies in enzyme immunoassays.
- b) Explain plasmid finger printing in clinical microbiology.
- c) Describe the laboratory testing for bactericidal activity.

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

- a) Discuss protoplast isolation, culture, and its applications.
- b) Write an account on Anti-idiotypes and molecular mimicry.
- c) Explain the different types of molecular markers (RFLP, RAPD, AFLP) with applications.

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**M.Sc. (Biotechnology) (Semester - III) (New) (NEP CBCS)  
Examination: March/April – 2026  
Advanced Pharmaceuticals (2311308)**

Day & Date: Wednesday, 22-04-2026  
Time: 11:00 AM To 01:30 PM

Max. Marks: 60

- Instructions:** 1) All questions are compulsory.  
2) Draw neat diagram and give equations whenever necessary.  
3) Figures to the right indicate full marks.

**Q.1 A) Multiple Choice Questions:**

**08**

- 1) Polyethylene is an example for \_\_\_\_\_.  
a) Co-polymer                      b) Block polymer  
c) Graft Polymer                      d) Photopolymer
- 2) Hydroxypropyl methyl cellulose (HPMC) possesses one of the following.  
a) Amphiphilic ion                      b) Anionic  
c) Cationic                      d) Non-ionic
- 3) The mass transfer of solid in to liquid this process is called as \_\_\_\_\_.  
a) Drug Dissolution                      b) Drug Diffusion  
c) Drug Absorption                      d) Drug Excretion
- 4) Flocculated suspension exhibits the flow of a type \_\_\_\_\_.  
a) Dilatant                      b) Newtonian  
c) Plastic                      d) Pseudoplastic
- 5) Cool Place temperature is in between \_\_\_\_\_.  
a) 10° C to 20° C                      b) 8° C to 25° C  
c) 30° C to 40° C                      d) 2° C to 8° C
- 6) One micrometre is equal to \_\_\_\_\_.  
a) 10<sup>-6</sup> centimetre                      b) 10<sup>-3</sup> centimetre  
c) 10<sup>-6</sup> meter                      d) 10<sup>-3</sup> meter
- 7) Which one of these distributions is more important in the design of dosage forms?  
a) Gaussian                      b) Number  
c) Normal                      d) Weight
- 8) Andreasen apparatus consists of \_\_\_\_\_.  
a) Balance                      b) Electrodes  
c) Hydrometer                      d) Pipette

- B) Write True or False. 04**
- 1) Greater the surface area lesser is the dissolution.
  - 2) Particle size be determined by coulter-counter method.
  - 3) Polymer are used in pharmaceutical for controlled drugs.
  - 4) Rheology studies the flowability of drugs.
- Q.2 Answer the following. (Any Six) 12**
- a) Define Physical pharmaceutics.
  - b) Define polymers.
  - c) Define Dissolution.
  - d) Define Surfactant System.
  - e) Define micelle.
  - f) Define Cyclodextrin.
  - g) Define co-solvents.
  - h) Define aerosol.
- Q.3 Answer the following. (Any Three) 12**
- a) Explain Biological implications of surfactants.
  - b) Explain Kinetics activation energy calculations.
  - c) Explain Enhancement of dissolution rate.
  - d) Explain lubricant sensitivity.
- Q.4 Answer the following. (Any Two) 12**
- a) Write a note on pharmaceutical granulation.
  - b) Write a note on factors affecting dissolution rate.
  - c) Write a note on Factors affecting phase behaviour.
- Q.5 Answer the following. (Any Two) 12**
- a) What are Solid dispersions? Explain in details types, methods of preparation.
  - b) Explain Phase behaviour of surfactant in binary and ternary systems.
  - c) What is advanced Pharmaceutical? Explain in details Particle characterization by size, shape and surface.

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**M.Sc. (Biotechnology) (Semester - IV) (New) (NEP CBCS)  
Examination: March/April - 2026  
Advanced Analytical Techniques (2311401)**

Day & Date: Thursday, 16-04-2026  
Time: 03:00 PM To 05:30 PM

Max. Marks: 60

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

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

- 1) Beer Lambert's law states that the amount of light absorbed by a material is directly Proportional to the \_\_\_\_\_.
  - a) Intensity of light
  - b) Conc. Of the material
  - c) Thickness of the medium
  - d) All of the above
- 2) Example of 2 dimensional chromatography if \_\_\_\_\_.
  - a) Ion exchange
  - b) Paper
  - c) Column
  - d) Gel filtration
- 3) Proteins can be separated by \_\_\_\_\_ electrophoresis.
  - a) Agarose
  - b) PAGE
  - c) capillary
  - d) Cellulose acetate
- 4) The wavelength range corresponding to UV-VIS region is \_\_\_\_\_.
  - a) 400-800 nm
  - b) 200-800
  - c) 25 $\mu$ m-2.5  $\mu$ m
  - d) 2.5  $\mu$ m-1mm
- 5) Scanning of external organization of structures is done in \_\_\_\_\_.
  - a) SEM
  - b) TEM
  - c) AFM
  - d) Fluorescent
- 6) The blotting technique used for identifying DNA sequences is \_\_\_\_\_.
  - a) Western
  - b) Southern
  - c) Northern
  - d) DOT
- 7) Mercury and Xenon are used as the light source in \_\_\_\_\_ microscopy.
  - a) Fluorescence
  - b) Confocal
  - c) SEM
  - d) TEM
- 8) The spectroscopic technique used for analysis of metal ions is \_\_\_\_\_.
  - a) FACS
  - b) Visible
  - c) NMR
  - d) Atomic absorption

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

- a) Only colored solutions can be measured by Colorimetry.
- b) Pulse field gel electrophoresis technique is better than SDS - PAGE for protein separation.
- c) Charge based separation is possible with Gel permeation chromatography.
- d) The technique of centrifugation is used for separation of Lipids.

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

- a) Write the basic principle involved in the technique of Centrifugation.
- b) Write the application of Mass Spectroscopy.
- c) Give the significance of blotting techniques.
- d) What is chromatofocussing? Explain.
- e) Write the general properties of electromagnetic radiation.
- f) Give the principle of Nephelometry.
- g) Write the uses of High speed refrigerated centrifuge?
- h) Explain the difference between Simple and Compound microscope.

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

- a) Write a note on GLC.
- b) Differentiate between 2-D and uni directional gel electrophoresis.
- c) Discuss the principle of optics involved in Microscopy.
- d) Explain the principle and procedure of Adsorption chromatography.

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

- a) Differentiate between Preparative and Analytical centrifugation technique.
- b) Discuss the general principle involved in HPLC with instrumentation.
- c) Write the basic principle involved in Electrophoresis and the factors effecting the electrophoretic mobility.

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

- a) Discuss the working and applications of MALDI-TOF.
- b) Discuss the significance of Western Blotting technique in Protein analysis.
- c) What are the sources of X-Rays? Where are they used?

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Set **P**

**M.Sc. (Biotechnology) (Semester - IV) (New) (NEP CBCS)**  
**Examination: March/April – 2026**  
**Bio Nanotechnology (2311402)**

Day & Date: Saturday, 18-04-2026  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 60

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

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

- 1) \_\_\_\_\_ nanoparticles are used to kill bacteria.
  - a) Silicon
  - b) Silver
  - c) Zinc oxide
  - d) Nickel
- 2) The melting point of particles in nano form \_\_\_\_\_.
  - a) Increases
  - b) Decreases
  - c) Remains the same
  - d) Increases then decrease
- 3) \_\_\_\_\_ a device which combines a biological component with physicochemical detector.
  - a) Biosensor
  - b) Bioreceptor
  - c) Bioluminsor
  - d) Bioradiator
- 4) Photosensitizing dyes are used to inactivate viruses in \_\_\_\_\_.
  - a) Photolysis
  - b) Photophosphorylation
  - c) Photodynamic inactivation
  - d) Photosynthesis
- 5) Nanoscience can be studied with the help of \_\_\_\_\_.
  - a) quantum mechanics
  - b) newtonian mechanics
  - c) macro-dynamics
  - d) Geophysics
- 6) \_\_\_\_\_ is an example for semiconducting nanowires.
  - a) Nickle
  - b) Platinum
  - c) Silicon
  - d) All of the above
- 7) \_\_\_\_\_ is an example of zero-dimensional nanostructure.
  - a) Nanoparticles
  - b) Nanorods
  - c) Nanotubes
  - d) All of the above
- 8) Which of the following is used for detection of sugar, glucose?
  - a) Biochip
  - b) Biosensor
  - c) Biometric sensor
  - d) None of the above

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

- 1) Self cleaning coatings are made of Titanium dioxide.
- 2) Sputtering and chemical vapor deposition is biological methods of Nanosynthesis.
- 3) Electrical sensors cannot sense biological responses.
- 4) Nanoparticles used in pharmaceutical delivery systems are called as nanocapsules.

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

- a) Define Sputtering.
- b) What are Biosensors?
- c) Give examples of metal nanoparticles.
- d) What is photodynamic therapy? Explain.
- e) Write the method of drug delivery.
- f) Give the significance of quantum mechanics.
- g) Write the importance of spectroscopy in characterization of nanoparticles.
- h) Explain the Sol Gel method of synthesis of nanomaterial.

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

- a) Give the scope of Bio-nanotechnology.
- b) Explain how SEM can be used to study nanomaterial.
- c) Describe the method of Pyrolysis in synthesis of nanostructure.
- d) Give the applications of Nanoparticles in environmental cleaning.

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

- a) Write a note on various methods of characterization of nanoparticles.
- b) Comment on the various applications of nanomaterials as biosensors.
- c) Define Nanobiotechnology. Write the principles involved in drug delivery.

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

- a) Discuss the Science behind Nanotechnology.
- b) Discuss the major milestones in nanotechnology.
- c) Discuss the various methods of biological synthesis of nanomaterials.

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Set **P**

**M.Sc. (Biotechnology) (Semester - IV) (New) (NEP CBCS)**  
**Examination: March/April – 2026**  
**Animal Biotechnology (2311405)**

Day & Date: Tuesday, 21-04-2026  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 60

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Draw neat diagrams and give equations wherever necessary.  
 4) Use of logarithmic table and calculator is allowed.  
 (At. Wts.: H= 1, C = 12, O=16, N= 14, Na =23, Cl = 35.5)

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

- 1) The process of dedifferentiation in cell culture can give rise to \_\_\_\_\_.  
 a) carcinoma cells  
 b) induced-pluripotent stem cells  
 c) fused protoplasts  
 d) single protoplasts
  
- 2) Transgenic animals are design to \_\_\_\_\_ our understanding of the role of genes disease.  
 a) increase  
 b) decrease  
 c) equalize  
 d) similar
  
- 3) After the first subculture, the primary culture is called \_\_\_\_\_.  
 a) daughter cells  
 b) cell Line  
 c) cell debris  
 d) clone
  
- 4) Embryonic stem cells are derived from the \_\_\_\_\_ of the blastocyst.  
 a) inner cell mass  
 b) ectoderm  
 c) mesoderm  
 d) blastocoel
  
- 5) An isotonic solution of inorganic salts present in approximately the correct physiological concentrations known as \_\_\_\_\_.  
 a) serum  
 b) blood  
 c) Balanced salt solution  
 d) plasma
  
- 6) \_\_\_\_\_ is a cell that results from the fusion of antibody producing myeloma cell and antigenically stimulated plasma cell.  
 a) Hybridoma  
 b) Embryonic Stem Cells  
 c) Mesenchymal Stem Cells  
 d) Hematopoietic Stem Cells
  
- 7) \_\_\_\_\_ refers to the varying ability of stem cells to differentiate into specialized cell types.  
 a) Cell-therapy  
 b) Cell-regeneration  
 c) Cell potency  
 d) Cell Viability



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**M.Sc. (Biotechnology) (Semester - IV) (New) (NEP CBCS)  
Examination: March/April – 2026  
Medical Biotechnology (2311406)**

Day & Date: Tuesday, 21-04-2026  
Time: 03:00 PM To 05:30 PM

Max. Marks: 60

- Instructions:** 1) All questions are compulsory.  
2) Draw neat diagram and give equations whenever necessary.  
3) Figures to the right indicate full marks.

**Q.1 A) Multiple choice questions.**

**08**

- 1) Which type of toxin is tetanus toxin?
  - a) enterotoxin
  - b) neurotoxin
  - c) cytotoxin
  - d) endotoxin
- 2) Which of the following characteristics of the microorganism does not help in causing infectious disease?
  - a) must enter the host
  - b) must metabolize in the host tissue
  - c) must resist host defenses
  - d) must not damage the host
- 3) Streptomycin is produced by which of the following organisms?
  - a) *Streptomyces noursei*
  - b) *Streptomyces nodosus*
  - c) *Streptomyces fradiae*
  - d) *Streptomyces griseus*
- 4) Which body part contains the largest microbial population?
  - a) stomach
  - b) small intestine
  - c) large intestine
  - d) mouth
- 5) Which of the following pathogens causes cholera in humans?
  - a) Fungi
  - b) Bacteria
  - c) Virus
  - d) Protozoan
- 6) *Vibrio cholerae* adheres to the epithelial cells of the small intestine by means of \_\_\_\_\_.
  - a) pili
  - b) proteins
  - c) hemagglutinin
  - d) hydrogen bonds
- 7) Which of the following is the example of Gram-negative bacteria?
  - a) *Lactobacillus*
  - b) *Escherichia coli*
  - c) *Staphylococcus aureus*
  - d) *Bacillus subtilis*
- 8) Which of the following does not affect the activity of penicillin?
  - a) bile
  - b) hydrochloric acid
  - c) cysteine
  - d) sodium hydroxide

- B) Fill in the blank:** **04**
- 1) Gas gangrene is caused by \_\_\_\_\_.
  - 2) Within \_\_\_\_\_ days after birth a stable flora develops.
  - 3) \_\_\_\_\_ bacteria causes toxic shock syndrome.
  - 4) Nystatin is effective in curing \_\_\_\_\_.

- Q.2 Answer the following. (Any Six)** **12**
- a) Give examples of antibiotic drugs.
  - b) Give examples of common pathogens.
  - c) What is haematology?
  - d) Give examples of autoimmune diseases.
  - e) Give examples of global pandemic diseases.
  - f) Which infections are common to neonatal babies?
  - g) Draw a labelled diagram of HIV virus.
  - h) Write about COVID.

- Q.3 Answer the following. (Any Three)** **12**
- a) Write a note on normal microflora of human body.
  - b) Describe human diseases caused by bacteria.
  - c) Biosensors in medical diagnostics.
  - d) Describe application of phages in therapeutics.

- Q.4 Answer the following. (Any Two)** **12**
- a) Describe in details drug resistance and sensitivity.
  - b) Describe in details pathogenesis of *salmonella typhi* with diagnosis and treatment.
  - c) Describe human diseases caused by viruses.

- Q.5 Answer the following. (Any Two)** **12**
- a) Describe in details the mode of action of Penicillin.
  - b) Define infection and describe clinical manifestations of an infection.
  - c) Write an account on vaccination for prevention of diseases.