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**M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022
(BIOTECHNOLOGY)
Microbiology**

Day & Date: Monday, 13-02-2023
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question 1 and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7
3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative. 10

- 1) _____ was discovered microorganisms using high-quality magnifying lenses.
 - a) Semmelweis
 - b) Louis Pasteur
 - c) Robert Hooke
 - d) Robert Koch
- 2) MTCC stands for _____.
 - a) Microbiology Type Culture Collection
 - b) Medicinal Type Culture Collection
 - c) Microbial Type Culture Collection
 - d) Magnetic Type Culture Collection
- 3) Methanogens are _____.
 - a) Eubacteria
 - b) Dinoflagellates
 - c) Slime moulds
 - d) Archaeobacteria
- 4) _____ can be found in the intestine of human as normal flora.
 - a) *Staphylococcus aureus*
 - b) *E.coli*
 - c) *Staphylococcus epidermidis*
 - d) *Corynebacterium spp*
- 5) For isolation of microorganism by spread plate technique _____ is used.
 - a) Nichrome wire loop
 - b) Iron wire loop
 - c) Cotton swab
 - d) Forceps
- 6) _____ stain used in cell wall staining.
 - a) Safranin
 - b) Methylene blue
 - c) Crystal violet
 - d) New Fuchsin
- 7) _____ genus of algae lives inside the body of hydra in the Endozoic algae.
 - a) Characium
 - b) Zoochlorella
 - c) Zooxanthellae
 - d) Caphaleuros virescens
- 8) _____ is the name of fungal infection in human beings.
 - a) Fungosis
 - b) Mucorsis
 - c) Mycosis
 - d) None of these
- 9) Influenza virus binds to _____ of the host cell membrane.
 - a) Omp
 - b) Glycoproteins
 - c) Polysaccharides
 - d) Sialic acid
- 10) _____ is not a prion disease.
 - a) Scrapie
 - b) Bovine spongiform encephalopathy
 - c) Lewy body dementia
 - d) Creutzfeldt Jakob disease

- B) Write true/false** **06**
- 1) Bacteria is assigned two names or binomial nomenclature a genus and a species.
 - 2) The counter stain used in Grams staining is Safranine.
 - 3) Autoclave is used for dry heat sterilization.
 - 4) Some algae are used in production of single cell proteins.
 - 5) Physiological saline is used for preparation of suspension.
 - 6) Virion particle contain only one type of nucleic acid i.e. DNA
- Q.2 Answer the following.** **16**
- 1) Write a note on modern methods of prokaryotes identification.
 - 2) Discuss the general characters of thermophiles
 - 3) Define culture media and write its types.
 - 4) Discuss the general properties of viruses
- Q.3 Answer the following.**
- a) Describe Principle, Mechanism and Procedure of reserve food material staining. **08**
 - b) Explain the replication in viruses **08**
- Q.4 Answer the following.**
- a) What are the techniques used for isolation of microorganisms? **08**
 - b) Write in detail Classification, Isolation, Cultivation and Enumeration of Plant viruses. **08**
- Q.5 Answer the following.**
- a) Discuss the general characters of Extremophiles.
 - b) Explain in detail Pathogenesis and Industrial applications of slime molds and protozoan's. **08**
- Q.6 Answer the following.**
- a) Write a note on reproduction in fungi. **08**
 - b) Discuss the general outline of numerical and polyphasic Taxonomy **08**
- Q.7 Answer the following.**
- a) Discuss the applications of extremophiles and unculturable microbes **08**
 - b) Write a note on history and scope of Microbiology. **08**

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**M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022
(BIOTECHNOLOGY)
Concept of Biochemistry**

Day & Date: Tuesday, 14-02-2023
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question 1 and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7
3) Figures to the right indicate full marks.

- Q.1 A) Choose Correct Alternative. 10**
- 1) The sucrose biosynthesis in plants results from condensation of fructose 6 phosphate with the _____ glucose.

a) ADP	b) GDP
c) NADP	d) UDP
 - 2) Elevated levels of _____ is used as a diagnostic tool for pregnancy,

a) GIH	b) HCG
c) TSH	d) ADH
 - 3) The deficiency of enzyme HGPRT results in _____ which is an inborn disorder.

a) Lesch-Nyhan syndrome	b) Marasmus
c) Pomes disease	d) Alkaptonuria
 - 4) In Ramchandran plot, the _____ angles represent the bond angles in C-C bond,

a) psi	b) phi
c) gamma	d) delta
 - 5) The phosphate and ribose groups are donated by _____ during the biosynthesis of nucleotides.

a) PRPP	b) Orotate
c) hypoxanthine	d) HGPRT
 - 6) During synthesis of cAMP, the cyclization of ATP molecule occurs in presence of _____ enzyme.

a) Invertase	b) ATP synthase
c) Adenylate cyclase	d) Phosphokinase
 - 7) Through the reactions catalyzed by transaldolase and transketolase, pentose phosphate pathway is linked with _____.

a) Beta oxidation	b) TCA cycle
c) Amino acid metabolism	d) Glycolysis
 - 8) The pleated sheets in secondary structure of protein are stabilized by _____ bonding between beta strands.

a) Peptide	b) Disulfide
c) Glycosidic	d) Hydrogen
 - 9) An agent that dissociates two integrated series of chemical reactions is known as an _____.

a) inhibitor	b) initiator
c) operator	d) Uncoupler

- 10) Long chain Acyl COA traverses inner mitochondrial membrane through _____ shuttle mechanism.
- a) malate aspartate
 - b) carnitine
 - c) glyoxylate
 - d) polynucleotide

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

- 1) Glycolysis has _____ irreversible steps.
- 2) ETC is located in _____.
- 3) RUBISCO enzyme catalyzes the carboxylation of _____.
- 4) Excessive fat accumulation negatively affecting the health is known as _____.
- 5) _____ hormones are secreted into the blood through ducts.
- 6) Ornithine is an intermediate of _____ cycle.

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

- a) Draw the biochemical pathway of Glycolysis and write its overall reaction.
- b) Write a note on biochemical composition of living systems.
- c) Define the terms: Nutrition, BMR and Balanced diet.
- d) Define hormone. Give general classification of hormones.

Q.3 Answer the following.

- a) Describe reactions, energetics and regulation of Pentose Phosphate pathway. **10**
- b) Describe the properties of biomolecules favoring living conditions. **06**

Q.4 Answer the following.

- a) Describe the components and mechanism of Oxidative phosphorylation. **10**
- b) Describe the nutritional disorders: PEM and Obesity. **06**

Q.5 Answer the following.

- a) Add an account on photosynthesis explaining cyclic and noncyclic photophosphorylation. **10**
- b) Describe the structure and role of cAMP as a secondary messenger. **06**

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

- a) Describe hormonal control of pregnancy and lactation.
- b) Add an account on inborn errors of metabolism.

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

- a) Describe diabetes as a metabolic disorder.
- b) Add an account on 'plant growth hormones'.

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**M.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022
(BIOTECHNOLOGY)
Inheritance Biology**

Day & Date: Wednesday, 15-02-2023
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question 1 and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7
3) Figures to the right indicate full marks.

- Q.1 A) Choose Correct Alternative. 10**
- 1) The number of contrasting characteristics of pea plant Mendel considered for his experiment _____.
 - a) Eight
 - b) Seven
 - c) Six
 - d) Five
 - 2) Crossing Over takes place in the _____.
 - a) Diakinesis stage
 - b) Anaphase stage
 - c) Pachytene stage
 - d) Leptotene stage
 - 3) Chromosomes found in the salivary gland of Drosophila is _____.
 - a) Polytene
 - b) Lampbrush
 - c) Supernumerary
 - d) B Chromosomes
 - 4) The following karyotypes is most likely to be found in normal human sperm
 - a) 22, Y
 - b) 23, X
 - c) 46, XX
 - d) 46, XY
 - 5) The Virus mediated gene transfer using genetically modified bacteriophage is called _____.
 - a) Transfection
 - b) Transduction
 - c) Transformation
 - d) Conjugation
 - 6) Viruses which cause lysis of bacteria are known as _____.
 - a) Lysogenic
 - b) Lytic
 - c) lipolytic
 - d) Lysozymes
 - 7) Mutation may be described as _____.
 - a) Continuous genetic variation
 - b) Phenotypic change
 - c) Discontinuous genetic variation
 - d) Change due to hybridization
 - 8) The map of the chromosome which shows identifiable sites is called _____.
 - a) gene expression
 - b) genome sequencing
 - c) chromosome walking
 - d) genome map
 - 9) Transduction is mediated by _____.
 - a) F factor
 - b) Cosmid
 - c) Phage vector
 - d) Plasmid vector
 - 10) Chemicals used for gene transfer methods include _____.
 - a) Poly ethylene glycol
 - b) MgCl₂
 - c) Glue
 - d) Agarose

- B) Fill in the blanks:** **06**
- 1) _____ called equational division.
 - 2) _____ is the unit of a genetic map.
 - 3) The process when some species migrates from the original to a new place which in turn changes the allele frequency is called _____.
 - 4) In Animals cytological study of recombination was done by _____.
 - 5) Incomplete dominance was first described in _____.
 - 6) The method widely used for transforming *invitro* animal cell cultures that uses lipid vesicles or liposomes is known as _____.

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

- 1) What are allele and explain in its types.
- 2) Discuss the screening of mutations methods based on phenotypes.
- 3) Write a short note on Polytene chromosome.
- 4) Explain the life cycle of *saccharomyces cerevisiae*.

Q.3 Answer the following.

- a) Describe in details of Hardy-Weinberg genetic equilibrium and causes of changes in allele frequency. **10**
- b) Explain the Mendelian laws in detail. **06**

Q.4 Answer the following.

- a) Discuss the mechanism involved in the development of genetic mosaics and genetic epistasis. **10**
- b) Explain the artificial methods of gene transformation. **06**

Q.5 Answer the following.

- a) Describe in details of gene mapping in Prokaryotes. **10**
- b) Discuss in details the allelic and gene interactions **06**

Q.6 Answer the following.

- a) Define Mendelian genetics and explain the drosophila eukaryotic model. **10**
- b) Define cytogenetics and discuss aneuploidy, euploidy and polyploidy **06**

Q.7 Answer the following.

- a) What are bacteriophages? Discuss about the discovery, structure of lambda phage. **10**
- b) Define Population genetics and explain the gene frequency and factors influencing. **06**

- B) Fill in the blanks OR write true/false** **06**
- 1) _____ a bar graph-like representation of data that buckets a range of classes into columns along the horizontal x-axis.
 - 2) student t-test is used when $N > \underline{\hspace{2cm}}$.
 - 3) The most frequent occurring observation is _____.
 - 4) _____ a group of organisms believed to comprise all the evolutionary descendants of a common ancestor in a phylogenetic tree
 - 5) The first biological database developed was _____.
 - 6) _____ was the first method used for protein secondary structure prediction.
- Q.2 Answer the following.** **16**
- a) Write a note on types of sampling.
 - b) Describe DNA sequence databases.
 - c) Explain in detail about BLAST with its variants.
 - d) Explain protein secondary structures in detail.
- Q.3 Answer the following.**
- a) Explain the diagrammatic representation of data. **10**
 - b) Write a note on probability. **06**
- Q.4 Answer the following.**
- a) Explain different types of ANOVA with example. **10**
 - b) Describe the Hypothesis testing. **06**
- Q.5 Answer the following.**
- a) Explain Composite Protein sequence databases. **10**
 - b) Write a note on different search engines in bioinformatics. **06**
- Q.6 Answer the following.**
- a) What is local and global alignment? Explain FASTA program with its type. **10**
 - b) What is phylogeny? Explain phylogenetic analysis MEGA tool. **06**
- Q.7 Answer the following.**
- a) Explain the different protein 3D structure visualization tools. **10**
 - b) Describe different protein 3-D structure validation servers. **06**

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M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2022
BIOTECHNOLOGY
Cell Biology

Day & Date: Monday, 20-02-2023
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

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

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

- 1) _____ proposed unified cell theory in late 1930s.
 - a) Antony van Leeuwenhoek
 - b) Matthias Schleiden and Theodor Schwann
 - c) Robert Hooke
 - d) Rudolf Virchow

- 2) Which of the following cell organelles is called the powerhouse of the cell?
 - a) Nucleus
 - b) Lysosomes
 - c) Chloroplast
 - d) Mitochondria

- 3) In _____ junction the integrin interacts with extracellular matrix outside cell and actin in side cytosol.
 - a) Hemidesmosome
 - b) Focal adhesion
 - c) Catherin
 - d) Desmosome

- 4) _____ Collagen is network forming collagen associated with basal laminae.
 - a) Type-I
 - b) Type-II
 - c) Type-III
 - d) Type-IV

- 5) Which of the following organelle do not contain DNA?
 - a) Nucleus
 - b) Chloroplast
 - c) Peroxisome
 - d) Mitochondria

- 6) _____ is an example of proto-oncogene.
 - a) p53
 - b) APC
 - c) Cyclins
 - d) BRCA1

- 7) Sandwich model of membrane lipid is given by _____.
 - a) Gorter and Grendel
 - b) Davson and Danielli
 - c) J. David Robertson
 - d) Singer and Nicolson

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- 8) The intermediate filament present in nuclear membrane is _____.
- a) desmin b) nestin
c) lamin d) vimentin
- 9) Nuclear envelope breaks during prophase due to _____ of nuclear lamin by MPF complex.
- a) phosphorylation b) Dephosphorylation
c) acetylation d) Methylation
- 10) The mammalian egg is surrounded by a thick layer called the _____.
- a) zona pellucida b) viteline membrane
c) cumulus d) Zona radiate

Q.1 B) Write True or False. 06

- 1) Gap junctions are constructed of transmembrane proteins called connexins.
- 2) If growth factor is absent the cell enters in G₂ phase of cell cycle.
- 3) Homologous chromosomes are separated during Anaphase II.
- 4) Cell organelles mitochondrion are called a suicidal bag.
- 5) Rudolf Virchow, a German pathologist proposed the cell theory.
- 6) The microtubule is made of dimer of Tubulin dimer Proteins.

Q.2 Answer the following. 16

- a) Explain in brief, Models of cell membrane.
- b) Describe in brief, working of actin.
- c) Write in brief, Programed cell death.
- d) Explain in brief, Regeneration in planaria.

Q.3 Answer the following.

- a) Explain in detail, hormones and growth factors. **08**
- b) Describe in detail, Ultra structure & function of chloroplast. **08**

Q.4 Answer the following.

- a) Explain in detail, mechanism of Active transport. **08**
- b) Write in detail on structure and functions of microtubules, microfilaments and intermediate filaments. **08**

Q.5 Answer the following.

- a) Write an essay on biology of oncogenes and anti-oncogenes. **10**
- b) Explain in brief, Cell Cycle Phases of meiosis. **06**

Q.6 Answer the following.

- a) Write an essay on Light induced signal transduction in Plant. **10**
- b) Explain in brief Notch Pathway. **06**

Q.7 Answer the following.

- a) Write an essay on embryonic development in frog. **10**
- b) Describe in brief regeneration in hydra. **06**

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**M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov - 2022
(BIOTECHNOLOGY)
Enzyme Technology**

Day & Date: Tuesday, 21-02-2023
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

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

Q.1 A) Multiple Choice Questions choose the correct answer. 10

- 1) _____ of the following is produced with the combination of apoenzyme and coenzyme.
 - a) Holoenzyme
 - b) Enzyme substrate complex
 - c) Prosthetic group
 - d) Enzyme product complex
- 2) Name the enzyme secreted by pancreas _____.
 - a) Pepsin
 - b) Chymotrypsin
 - c) Trypsin
 - d) Alcohol dehydrogenase
- 3) Binding-energy is _____.
 - a) Free energy released in the formation of enzyme-substrate interaction
 - b) The energy required to form a bond
 - c) The energy required to bind substrate
 - d) It is the activation energy
- 4) Name the enzyme which is found in tears, sweat, and an egg white _____.
 - a) Ribozyme
 - b) Lysozyme
 - c) Zymogen
 - d) Isozymes
- 5) A _____ is a biocatalyst that increases the rate of the reaction without being changed.
 - a) Aluminum oxide
 - b) Silicon dioxide
 - c) Enzyme
 - d) Hydrogen peroxide
- 6) _____ of the following is not a co-enzyme.
 - a) NAD
 - b) NADP
 - c) FAD
 - d) Mn⁺⁺
- 7) The rate of breakdown of metabolites is termed as _____.
 - a) Metabolic state
 - b) Metabolism
 - c) Steady state
 - d) Homeostasis
- 8) _____ of the following protein is also known as intrinsic proteins.
 - a) Peripheral proteins
 - b) Lipid-anchored proteins
 - c) Intracytoplasmic proteins
 - d) Integral membrane proteins

- 9) _____ of the following is a single-pass transmembrane protein.
- a) Carbonate-bicarbonate exchanger
 - b) Glucose permease
 - c) GPCR
 - d) Glycophorin
- 10) _____ is a bond between amino acids called.
- a) Ionic bond
 - b) Acidic bond
 - c) Peptide bond
 - d) Hydrogen bond

B) Write True/False**06**

- a) Extrinsic proteins are held tightly to the lipid bilayer.
- b) Activation energy is defined as the minimum amount of extra energy required by a reacting molecule to get converted into product.
- c) The expansion of SGOT is serum glutamic-oxaloacetic transaminase.
- d) Enzyme induction is a process in which a molecule induces the expression of an enzyme.
- e) A biosensor is defined as a device that produces a immeasurable signal proportional to the concentration of the target analyte.
- f) Competitive inhibition occurs when an inhibitor binds to the enzyme at a location other than the active site.

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

- a) Explain lock and key hypothesis of enzymes.
- b) Glucose oxidase
- c) Cholesterol oxidase
- d) Lysozyme

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

- a) Explain the methods graphical procedures in enzymology. List out the advantages and disadvantages of alternate plotting.
- b) What are Modulators? Explain in detail about protein ligand binding including measurements, analysis of binding, isotherms, and cooperativity.

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

- a) Describe the effect of partition on kinetics and performance with respect to charge and hydrophobicity (pH, temperature and K_m).
- b) Define the term immobilization. Explain the various methods of immobilization and their applications.

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

- a) What are inhibitors? Describe the mechanism of inhibition of enzymes.
- b) Write a note on clinical applications of enzymology.

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

- a) Explain the mechanism involved in studying fast reactions of enzymes.
- b) Describe metabolic engineering and enzyme engineering.

Q.7 Answer the following.

- a) Explain the significance of 1UB system, rationale, overview with specific examples in nomenclature and classification of the enzymes.
- b) Describe the importance ribonuclease, trypsin, carboxypeptidase, phosphorylase, aspartate transcarbamylase.

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**M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov - 2022
(BIOTECHNOLOGY)
Molecular Cell Processing**

Day & Date: Wednesday, 22-02-2023
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

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

Q.1 A) Multiple Choice Questions choose correct alternative. 10

- 1) The more amount of repetitive DNA is present in _____ part of the genome.
 - a) Telomeres
 - b) Telomeres and Centromeres
 - c) Centromeres
 - d) Dispersed throughout the genome
- 2) The polycistronic mRNA is the characteristics of _____.
 - a) Replication
 - b) General transcription
 - c) Operon
 - d) B-DNA
- 3) _____ of the following is true about RNA polymerase.
 - a) It can synthesize DNA in the 5' to 3' direction
 - b) It can synthesize DNA in the 3' to 5' direction
 - c) It can synthesize mRNA in the 3' to 5' direction
 - d) It can synthesize mRNA in the 5' to 3' direction
- 4) _____ histone is absent in the core of a nucleosome.
 - a) H2A
 - b) H1
 - c) H2B
 - d) H3 & H4
- 5) _____ of the following enzymes removes the super coiling in DNA during replication.
 - a) Gyrase
 - b) Ligase
 - c) Helicase
 - d) DNA polymerase
- 6) RNA dependent DNA polymerase is involved in _____.
 - a) DNA Replication
 - b) Transcription
 - c) RNA Replication
 - d) Reverse Transcription
- 7) Termination of transcription is triggered by _____.
 - a) RNA polymerase
 - b) Rho
 - c) SSB
 - d) Tur protein
- 8) 18S RNA is present in _____ subunit.
 - a) 30S
 - b) 50S
 - c) 60S
 - d) 40S

- 9) _____ of the following three codons translate as serine.
- | | |
|--------|--------|
| a) CCC | b) UGC |
| c) CAU | d) AUG |
- 10) _____ 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/false**06**

- Four channels or sites are present in the ribosome.
- Histones have a high content of negatively charged amino acids.
- The RecBCD pathway involves the use of ligases.
- Presence of lactose itself induces the production of β -galactoside transferase.
- Thymine undergoes spontaneous damage under physiological conditions.
- Protein folding not a type of post translational modification.

Q.2 Answer the followings.**16**

- Give an account on Avery MacLeod and McCarty.
- Describe the DNA replication inhibition.
- Describe the significance of alternative splicing.
- Give an account on regulation of translation.

Q.3 Answer the followings.**16**

- Explain different types of mutations.
- Explain the Nucleotide and base Excision repair.

Q.4 Answer the followings.**16**

- Describe in detail the mechanism of eukaryotic translation.
- Write a note on post translational modification of proteins.

Q.5 Answer the followings.**16**

- Explain in detail the structure of ara operon and the mechanism of regulation.
- Describe in detail about RNA Polymerases I, II and III.

Q.6 Answer the followings.**16**

- Explain in detail DNA reassociation kinetics and its applications
- Explain in detail the genome organization in prokaryotes.

Q.7 Answer the followings.**16**

- Explain in detail the mechanism of DNA replication in prokaryotes.
- Explain in detail the enzymes and proteins involved in eukaryotic DNA replication.

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**M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2022
(BIOTECHNOLOGY)**

Industrial and Environmental Biotechnology

Day & Date: Monday, 13-02-2023

Max. Marks: 80

Time: 11:00 AM To 02:00 PM

- Instructions:** 1) Question 1 and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7
3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative. 10

- 1) The bioreactors are used for _____.
 - a) Large scale production of the desired gene product
 - b) Growing microbes in laboratories
 - c) PCR reactions
 - d) Downstream processing
- 2) _____ of the following is correctly matched.
 - a) Stirrer- Maintains temperature
 - b) Sampling ports- for adding nutrients
 - c) Nutrient medium-nutrition for microbes
 - d) pH control system- Oxygen supply
- 3) Yeast cannot ferment starch and complex carbohydrates because they _____.
 - a) Drug
 - b) lack zymase
 - c) lack diastase
 - d) lack lipase
- 4) Citric acid is produced by _____.
 - a) Mucor
 - b) aspergillus
 - c) Rhizopus
 - d) Erythrocytes
- 5) The first antibiotic was discovered by _____.
 - a) R Koch
 - b) Louis Pasteur
 - c) A. Fleming
 - d) W. Fleming
- 6) The foams of fermentation can be controlled by providing _____.
 - a) Lactase
 - b) Antifoams
 - c) Base
 - d) Acid
- 7) _____ exposure is defined as exposure to a chemical for less than 24 hours.
 - a) Acute
 - b) Subacute
 - c) biotechnology
 - d) Chronic
- 8) Binding of certain _____ to the protein initiates degeneration of long axons.
 - a) Organophosphates
 - b) Succinylcholine
 - c) Molecule
 - d) Indiosyncreasy
- 9) _____ in association with lipid and protein represent the main constitute of fungal cell wall.
 - a) Methanol
 - b) Polysaccharides
 - c) Rhizopus
 - d) Biofuel

- 10) Size exclusion chromatography is also known as _____.
a) Hydrophobic chromatography
b) Molecular sieve chromatography
c) Affinity chromatography
d) 2D gel electrophoresis

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

- 1) Curd cheese and butter are produced by _____.
- 2) Pulses are mixed with other cereals and fermented to produce traditional Indian breakfast foods such as _____.
- 3) An enzyme produced commercially from saccharose _____.
- 4) _____ is a non- biological process.
- 5) The process of particles settling to the bottom of a body of water _____.
- 6) Descriptive _____ is concentrated directly with toxicity testing.

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

- 1) Photobioreactor sterilization
- 2) Single cell protein
- 3) Describe the solvent extraction process in protein purification
- 4) Write a short note on bioleaching, and biotransformation

Q.3 Answer the following.

- a) Explain in detail about various methods of purification using chromatography. **10**
- b) Write a note on the importance of bioaccumulation, bioassimilation in heavy metal contaminated water treatment. **06**

Q.4 Answer the following.

- a) Explain various steps involved in Streptomycin and Tetracycline antibiotic production. **10**
- b) Write a short note on renewable energy resources. **06**

Q.5 Answer the following.

- a) Explain the applications of Computer in bioprocess engineering. **10**
- b) What are fermented food products? Write a short note on their benefits. **06**

Q.6 Answer the following.

- a) What is Solid Waste Management? Explain in detail types of waste. **10**
- b) Write a short note on microbial growth kinetics. **06**

Q.7 Answer the following.

- a) Explain the importance of biomaterials in creating the clean environment. **10**
- b) Describe the production and applications of biofertilizers. **06**

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**M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2022
(BIOTECHNOLOGY)
Genetic Engineering**

Day & Date: Tuesday, 14-02-2023
Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Question 1 and 2 are compulsory.
2) Attempt any Three from Q.3 to Q.7
3) Figures to the right indicate full marks.

Q.1 A) Choose Correct Alternative. 10

- 1) Multiple cloning sites are the sites for _____ enzyme.
 - a) Polymerase
 - b) Nuclease
 - c) Ligase
 - d) Kinase
- 2) Taq DNA polymerase is obtained from _____.
 - a) Virus
 - b) Bacteria
 - c) Fungi
 - d) Plant
- 3) The transgenic animal has transgene in _____ cells of its body.
 - a) nerve
 - b) muscle
 - c) germ
 - d) all body
- 4) M13 is an example for _____ vector
 - a) Viral
 - b) Bacterial
 - c) BAC
 - d) YAC
- 5) The golden rice is rich in _____.
 - a) Gold
 - b) Vitamin A
 - c) Albumin
 - d) Xanthane
- 6) _____ of the following technique is based on restriction digestion.
 - a) RAPD
 - b) HPLC
 - c) RFLP
 - d) GLC
- 7) VNTR loci are used for analysis in _____ technique.
 - a) Southern blotting
 - b) Northern blotting
 - c) Western blotting
 - d) DNA finger printing
- 8) The chemical used for depurination in Maxam and Gilberts method is _____.
 - a) Piperidine
 - b) Hydrazine
 - c) Formic acid
 - d) DMSO
- 9) The chemical method of gene transfer makes use of _____ Chemical.
 - a) Sodium hydroxide
 - b) Calcium chloride
 - c) Iron
 - d) Calcium carbonate
- 10) Sickle cell anemia is associated with _____ cells.
 - a) RBC
 - b) WBC
 - c) Platelet
 - d) Lymphocyte

- B) Fill in the blanks:** **06**
- 1) The restriction enzyme EcoRI is isolated from _____ bacteria.
 - 2) The origin of replication in plasmid vector is named as _____.
 - 3) Annealing temperature is a parameter of _____ technique.
 - 4) _____ Molecule serves as template for cDNA synthesis.
 - 5) _____ is called as chain termination method of DNA sequencing
 - 6) To obtain transgenic animal, the transgene is inserted in _____ cell
- Q.2 Answer the following.** **16**
- a) Add a note types of nuclease enzymes.
 - b) Write a note on cosmid and phagemid vectors.
 - c) Write a brief account molecular markers with examples.
 - d) Write a note on transgenic plants with examples
- Q.3 Answer the following.** **16**
- a) Write a note classification of restriction endonucleases.
 - b) Add a note on types of viral vectors with applications.
- Q.4 Answer the following.** **16**
- a) Explain the types of screening for recombinant cells.
 - b) Add an account on methods of DNA sequencing.
- Q.5 Answer the following.** **16**
- a) Explain the technique of DNA microarray with applications.
 - b) Write a note on different methods of gene transfer.
- Q.6 Answer the following.** **16**
- a) Write a note on technique of PCR with applications.
 - b) Explain molecular diagnosis and detection of genetic diseases.
- Q.7 Answer the following.** **16**
- a) Define gene therapy. Explain the types of gene therapy.
 - b) Write a note on recombinant hormones and vaccines with examples.

Seat No.	
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**M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2022
(BIOTECHNOLOGY)**

Animal Biotechnology and Stem Cell technology

Day & Date: Monday, 20-02-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

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

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

10

- 1) _____ is established when the cells taken directly from animal tissue are added to growth medium.
a) Primary culture b) Secondary culture
c) Suspension culture d) Hybrid culture
- 2) _____ are hybrid cells capable of continuous production of monoclonal antibodies.
a) Stem cells b) Hybridomas
c) Transformed cells d) None of these
- 3) _____ vaccine was the first human vaccine produced using large scale cell culture techniques.
a) Rubella b) Rabies
c) Mumps d) Polio
- 4) Embryonic stem cells are derived from the _____ cell masses of normal blastocysts.
a) Inner b) Outer
c) Peripheral d) None of these
- 5) The primary culture, when subcultured becomes _____.
a) Adherent culture b) Cell line
c) Media d) Non adherent culture
- 6) When unspecialized stem cells give rise to specialized cells, the process is called _____.
a) Differentiation b) Specialization
c) Potency d) Regeneration
- 7) Embryonic stem cells isolated from _____ are the most commonly used in the laboratory.
a) Mouse blastocyst b) Mouse fibroblast
c) Mouse hepatocytes d) Mouse melanocytes

SLR-GE-14

- 8) _____ technique is used to attain the natural geometry of tissues.
- a) Tissue engineering
 - b) Filter well inserts
 - c) Lens paper
 - d) Plexiglas
- 9) Apoptosis can be detected by _____.
- a) DPA Test
 - b) AME'S Test
 - c) DNA laddering
 - d) Orcinol test
- 10) The most widely used natural media is _____.
- a) Milk
 - b) Blood
 - c) Serum
 - d) Coconut water

B) Write True or False.

06

- 1) Hybridomas combine the key properties of myeloma and B-lymphocytes.
- 2) The foreign gene is constructed using recombinant DNA methodology.
- 3) Serum containing media is less expensive.
- 4) The term 'Tissue culture' is used when cells are maintained in vitro for 12 hours.
- 5) Lymphocytes are one of the many types of white blood cells.
- 6) Enzymes used in tissue disaggregation are Trypsin and collagenase.

Q.2 Answer the following.

16

- a) Write note on cryopreservation.
- b) Write note on Hybridoma technology.
- c) Define animal biotechnology. Write note on suspension culture.
- d) Write note on hematopoietic stem cells.

Q.3 Answer the following.

16

- a) Explain in brief 'Scaling up the cell culture to large scale'.
- b) Describe different types of cell culture media.

Q.4 Answer the following.

16

- a) What is transgenic animal technology? How stem cell cultures are used in production of transgenic animals.
- b) Briefly explain 3D cell culture.

Q.5 Answer the following.

16

- a) Write note on.
 - 1) Cell lines
 - 2) Knock out animals
- b) Write in detail about Immunoisolation techniques.

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

- a) Explain in brief the role of serum as a media supplement with respect to advantages and disadvantages.
- b) Explain Isolation culture and characterization protocols of adult stem cell.

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

- a) Explain in brief- Common cell culture contaminants.
- b) Explain Bioartificial Pancreas.

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**M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2022
(BIOTECHNOLOGY)**

Advanced Analytical Techniques

Day & Date: Tuesday, 21-02-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

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

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

- 1) Fluorescence microscopy is based on _____ phenomenon.
 - a) Emission
 - b) Adsorption
 - c) Transmission
 - d) Atomic phase
- 2) The inert standard salt plates are used in _____ spectroscopy.
 - a) UV
 - b) IR
 - c) NMR
 - d) CD
- 3) Quartz cuvette is used for the wavelength range _____.
 - a) 400-780nm
 - b) 2-180nm
 - c) 200-400nm
 - d) 800nm-1600nm
- 4) IR radiations interacts with _____ of the molecule.
 - a) electron
 - b) nucleus
 - c) bond
 - d) orbit
- 5) _____ are labelled in blotting technique.
 - a) DNA
 - b) Probe
 - c) Membrane
 - d) Buffer
- 6) _____ is one of the separation techniques.
 - a) Spectroscopy
 - b) Autoradiography
 - c) Chromatography
 - d) Microscopy
- 7) In gas chromatography the stationary phase is usually _____.
 - a) Solid
 - b) Liquid
 - c) Gas
 - d) Plasma
- 8) In electromagnetic spectrum, energy and wave length are _____ proportional.
 - a) directly
 - b) equally
 - c) inversely
 - d) differently

SLR-GE-15

- 9) _____ is an example of vertical gel electrophoresis.
- a) Agarose
 - b) Polyacryl amide
 - c) Paper
 - d) Capillary
- 10) The longest columns are used in _____ chromatography.
- a) Ion exchange
 - b) Gel Filtration
 - c) Affinity
 - d) HPLC

Q.1 B) Fill in the blanks. **06**

- 1) The technique which makes use of ampholytes is _____.
- 2) The principle used in chromatography is _____.
- 3) _____ are called as molecular scissors.
- 4) Angular velocity is a part of _____ technique.
- 5) The blotting technique used for the detection of proteins is _____.
- 6) SEM stands for _____.

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

- a) Add a note on principle of centrifugation.
- b) Write a note on applications of column chromatography.
- c) Write a brief account on capillary electrophoresis.
- d) Write a note on applications of radio isotopes in biology.

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

- a) Write a note on Scanning Electron Microscopy.
- b) Write the principle and applications of Ion exchange chromatography.

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

- a) Explain the principle and components of SDS-PAGE.
- b) Add an account on Southern blotting technique with applications.

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

- a) Add a note on properties of electromagnetic radiations.
- b) Explain the principle and instrumentation of UV-Visible spectroscopy.

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

- a) Explain different methods of sample preparation in IR spectroscopy.
- b) Write a note on principle and applications of MALDI-TOF.

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

- a) Define radioactivity. Explain methods of detection.
- b) Add a note on types and applications of centrifugation technique.

Seat No.	
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**M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2022
(BIOTECHNOLOGY)**

Research Methodology and Intellectual Property Rights (IPR)

Day & Date: Wednesday, 22-02-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

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

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

10

- 1) A theory is _____.
 - a) An accumulated body of knowledge
 - b) Includes inconsequential ideas
 - c) independent of research methodology
 - d) Viewed uncritically
- 2) _____ is the first step of Research process.
 - a) Experiment
 - b) Collection of Data
 - c) Editing and Coding
 - d) Selection of a problem
- 3) Example for fact finding study is _____.
 - a) Pure Research
 - b) Survey
 - c) Action Research
 - d) Long term Research
- 4) _____ is the purpose of research.
 - a) To describe and explain a new phenomenon
 - b) To verify what has already been established
 - c) To reject what has already been accepted as a fact
 - d) To describe and explain an old phenomenon
- 5) The correlational research seeks to _____.
 - a) Determine the relationship between two or more variables
 - b) Study of only one variable
 - c) No relationship between two variables
 - d) Study problems
- 6) _____ is a way to systematically solve the research problem.
 - a) Technique
 - b) Operations
 - c) Research methodology
 - d) Research Process

SLR-GE-16

- 7) The chronological development of information in the body of the report is done according to the _____.
 - a) order in which events occurred
 - b) collection of data
 - c) logical sequence of events
 - d) choice of the writer
- 8) _____ of the following is an “intellectual property” as per IPR Laws in India.
 - a) Forms
 - b) Industrial protocol
 - c) Trademark of Tata Company
 - d) Ideas
- 9) The rights of a patentee are _____.
 - a) Sell or distribute
 - b) cannot give on License
 - c) cannot Assign the property to others
 - d) cannot Sell or distribute
- 10) _____ of the following is advantage of Plant Breeder’s Right
 - a) promotion of monopoly
 - b) increased cost
 - c) improvement in quality
 - d) slower development

Q.1 B) Write True or False.

06

- 1) It is essential that you evaluate the quality of internet resources because information obtained via the internet ranges from very poor to very good.
- 2) Researchers are tempted to rely too heavily on data collected in a prior study and use it in the interpretation of a new study.
- 3) The validity and reliability of the data should be checked occasionally.
- 4) First UPOV act was drafted in the year 1930.
- 5) Patent Act, 1970 is an intellectual property law.
- 6) The data collected by someone other than user is called primary data.

Q.2 Answer the following.

16

- a) Explain the characteristics of research.
- b) Describe ANOVA.
- c) Explain the detail the guidelines for writing abstract.
- d) Write a note on types of Plagiarism.

SLR-GE-16

- Q.3 Answer the following.** **16**
- a) Explain the Criteria for registration of a new plant variety.
 - b) Explain types of technology transfer.
- Q.4 Answer the following.** **16**
- a) Describe in detail the Patent procedure in India.
 - b) Discuss in detail the patent case study with respect to Basmati rice and Turmeric.
- Q.5 Answer the following.** **16**
- a) Explain in detail the author instructions of Indian journal of Biotechnology.
 - b) Discuss in detail the guidelines for writing results and discussion.
- Q.6 Answer the following.** **16**
- a) Describe in detail the types of Sampling.
 - b) Explain in detail the Chi-square test with example and its applications.
- Q.7 Answer the following.** **16**
- a) Write a note on formulation of hypothesis and research design.
 - b) Explain in detail the objectives of research and types of research.

Seat No.	
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**M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2022
(BIOTECHNOLOGY)**

Medical Biotechnology and Bionanotechnology

Day & Date: Thursday, 23-02-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

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

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

10

- 1) Each of the following organisms is an important cause of urinary tract infections except _____.
 - a) Klebsiella pneumoniae
 - b) Escherichia coli
 - c) Bacteriodes fragilis
 - d) Proteus mirabilis

- 2) _____ disease is best diagnosed by serologic means.
 - a) Pulmonary tuberculosis
 - b) Gonorrhoea
 - c) Actinomycosis
 - d) Q Fever

- 3) Attachment of erythrocytes to the surface of the virally infected cell is termed as _____.
 - a) Interference
 - b) Hemadsorption
 - c) Neutralization
 - d) Complement fixation

- 4) In glucose electrode, glucose oxidase has been coupled to an electrode by _____.
 - a) Ferrocene derivatives
 - b) Urease
 - c) Polyacrylamide
 - d) Biochips

- 5) The size of nanoparticles is between _____ nm.
 - a) 100 to 1000
 - b) 0.1 to 10
 - c) 1 to 100
 - d) 0.01 to 1

- 6) _____ antibiotic has a beta-lactam ring.
 - a) Cephalosporin
 - b) Penicillin
 - c) Tetracycline
 - d) Streptomycin

- 7) _____ toxin is produced by *Streptococcus pyogenes*.
 - a) Shiga like toxin
 - b) Alpha toxin
 - c) Erythrogenic toxin
 - d) Cyanotoxin
- 8) _____ processes of materials were not described as Nanotechnology.
 - a) Separation
 - b) Creation
 - c) Processing
 - d) Consolidation
- 9) The initial tools used to help launch the nanoscience revolution were _____.
 - a) Binoculars
 - b) Microscope
 - c) Scanning probe instruments
 - d) Interferometer
- 10) The melting point of particles in nano form
 - a) Increases
 - b) Decreases
 - c) Remains the same
 - d) Increases then decrease

B) Write True or False.

06

- 1) First mammal produced by IVF was mouse.
- 2) IVF involves transfer of Ovum into the fallopian tube.
- 3) In Agarose gel electrophoresis, DNA molecule gets separated on the basis of charge to size ratio.
- 4) TiO₂ is one of the nanomaterial used in the remediation of Waste.
- 5) Quantum dots are used as tags for carriers of drugs in medical field.
- 6) Nanoparticles used in pharmaceutical delivery systems are called asnanocapsules.

Q.2 Answer the following.

16

- a) Describe the Pathogenesis of Malaria
- b) Write a note on Antifungal drugs
- c) Write a note on thin films
- d) Write a note on Bio-based protocol for nanoparticles

Q.3 Answer the following.

16

- a) Discuss about the epidemiology and pathogenesis of *Salmonella typhi* disease.
- b) Explain details of concept and development of Biosensor.

- Q.4 Answer the following.** **16**
- a) Give a brief account on the interferon's
 - b) Write a short note on Inactivation of Viruses
- Q.5 Answer the following.** **16**
- a) Write a note on Drug delivery
 - b) Describe Physical methods involved synthesis of nanoparticles.
- Q.6 Answer the following.** **16**
- a) Give a brief account on the Pathogenesis of HSV.
 - b) Explain laboratory diagnosis methods of common infective diseases.
- Q.7 Answer the following.** **16**
- a) What are Nanoparticles and explain in details its biological applications.
 - b) Explain in details about the antiviral drugs.