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M.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023
BIOTECHNOLOGY
Microbiology (MSC33101)

Day & Date: Wednesday, 19-07-2023

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 correct alternative. (MCQ)

10

- 1) The basic taxonomic group of bacterial taxonomy is _____.
 - a) Family
 - b) Species
 - c) Sub Species
 - d) Genus
- 2) ATCC stands for _____.
 - a) Asian Type Culture Collection
 - b) American Type Culture Collection
 - c) Agricultural Type Culture Collection
 - d) Automatic Type Culture Collection
- 3) The micro-organisms that grow at high salinity are _____.
 - a) Alkalophiles
 - b) Osmophiles
 - c) Psychrophiles
 - d) Halophiles
- 4) Bacteria which can grow in presence or absence of oxygen are called _____.
 - a) Aerobic
 - b) Anaerobic
 - c) Facultative Anaerobic
 - d) Obligate Anaerobic
- 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) In capsule staining by maneval's method, Maneval's solution is prepared by using a mixture of acid fuchsin and _____.
 - a) Acetic acid
 - b) Carbolic acid
 - c) Citric acid
 - d) Butyric acid
- 7) _____ genus of algae lives inside the body of hydra in the Endozoic algae.
 - a) Characium
 - b) Zoochlorella
 - c) Zooxanthellae
 - d) Caphaleuros virescens

SLR-SE-1

- 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) A structural component that is found in all viruses is _____.
- a) The envelope
 - b) DNA
 - c) Capsid
 - d) Tail fibers

Q.1 B) Write true/false. 06

- 1) Genus is a population derived from a pure culture of isolated organism.
- 2) The counter stain used in Grams staining is Safranin.
- 3) Hot air oven used for steam sterilization.
- 4) Some algae are used in production of single cell proteins.
- 5) The sterilization by U.V. radiation is also known as cold sterilization.
- 6) Virion particle contain only one type of nucleic acid i.e. DNA.

Q.2 Answer the following. 16

- a) Define the terms- Taxonomy, Classification, Species and Strain.
- b) Write the general characters of oxygenic and anoxygenic photosynthetic microbes.
- c) Define stain and describe various types of stains.
- d) Write the general properties of viruses.

Q.3 Answer the following.

- a) Explain in detail reproduction in algae. **08**
- b) Discuss the replication of viruses. **08**

Q.4 Answer the following.

- a) Explain in detail history and scope of Microbiology. **08**
- b) Write an essay on general characters of Extremophiles. **08**

Q.5 Answer the following.

- a) Describe Principle, Mechanism and Procedure of cell wall staining. **08**
- 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 Classification, Isolation, Cultivation and Enumeration of Animal viruses. **08**
- b) Discuss the general outline of numerical and polyphasic Taxonomy. **08**

Q.7 Answer the following.

- a) Explain in detail applications of extremophiles and unculturable microbes. **08**
- b) Describe the isolation of microorganisms by using various techniques. **08**

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Set **P**

M.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023
BIOTECHNOLOGY
Concept of Biochemistry (MSC33102)

Day & Date: Thursday, 20-07-2023

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) Cellulose is different from amylose in having the presence of _____ linkage.
 - a) Peptide
 - b) Disulfide
 - c) alpha 1,4
 - d) beta 1,4
- 2) Long chain Acyl CoA traverses inner mitochondrial membrane through _____ shuttle mechanism.
 - a) malate aspartate
 - b) carnitine
 - c) glyoxylate
 - d) polynucleotide
- 3) In Ramchandran plot, the _____ angles represent the bond angles in C-N bond.
 - a) psi
 - b) phi
 - c) gamma
 - d) delta
- 4) Each cycle of β - oxidation liberates a two carbon unit of _____ CoA.
 - a) Acetyl
 - b) Butyryl
 - c) Acyl
 - d) Malonyl
- 5) Dihydro-orotate and orotate are the ring structures formed during biosynthesis of _____.
 - a) Purines
 - b) Pyrimidines
 - c) Peptones
 - d) Histones
- 6) Glycolysis and gluconeogenesis are regulated mainly under the action of hormones _____.
 - a) estrogen and progesterone
 - b) thyroxin and oxytocin
 - c) FSH and ACTH
 - d) insulin and glucagon
- 7) Macromolecules are constructed from simple precursors according to hierarchy of _____.
 - a) increasing structural complexity
 - b) decreasing structural complexity
 - c) without structural complexity
 - d) functional diversity
- 8) The number of amino acids per turn of an alpha helix is about _____.
 - a) 20.2
 - b) 12.6
 - c) 4.8
 - d) 3.6

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M.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023
BIOTECHNOLOGY
Inheritance Biology (MSC33103)

Day & Date: Friday, 21-07-2023
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Choose correct alternative. 10

- 1) After cross fertilization of true breeding tall and dwarf plants, the F1 generation was self-fertilized. The resultant plants have genotype in the ratio _____.
 - a) 1:2:1 (homozygous tall: heterozygous tall: dwarf)
 - b) 1:2:1 (heterozygous tall: homozygous tall: dwarf)
 - c) 3:1 (Tall: Dwarf)
 - d) 3: 1 (Dwarf: tall)
- 2) Alleles of different genes that are on the same chromosome can occasionally be separated by a phenomenon called _____.
 - a) Crossing over
 - b) Continuous variation
 - c) epistasis
 - d) Pleitropy
- 3) Lampbrush Chromosomes occur in _____.
 - a) Oocytes
 - b) Cancer cells
 - c) Lymph glands
 - d) Salivary glands
- 4) The following human diseases is least likely to be caused by aneuploidy _____.
 - a) Down syndrome
 - b) Fragile X syndrome
 - c) Turner syndrome
 - d) Klinefelter syndrome
- 5) DNA solution injected directly into the cell using micromanipulators is called _____.
 - a) Microinjection
 - b) Micromanipulator mediated DNA delivery
 - c) Micro faction
 - d) None of these
- 6) The following contain satellite RNAs _____.
 - a) Plant viruses
 - b) Bacteriophages
 - c) Prions
 - d) Viroids
- 7) The p^2 in the below mentioned Hardy Weinberg Equation indicate $-(p + q)^2 = p^2 + 2pq + q^2$ _____.
 - a) individuals that are heterozygous dominant
 - b) individuals having a lethal allele
 - c) individual that are homozygous dominant
 - d) individuals that are homozygous recessive

- 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 _____.
 - 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**

- 9) The gel like consistency of extracellular matrix is due to the _____.
a) Collagen b) Elastin
c) Polysaccharide d) Adhesion proteins
- 10) Which of the following cell organelles is called the powerhouse of the cell?
a) Nucleus b) Lysosomes
c) Chloroplast d) Mitochondria

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

- 1) The approximate diameter of microfilament is 7 nm.
- 2) Gap junctions are constructed of transmembrane proteins called desmoglidinjs.
- 3) Latitudinal plane of cleavage lies on the animal vegetal axis and divides egg into equal halves.
- 4) It is equally important to ensure that the genome is replicated only once per cell cycle.
- 5) The polymorphic nuclear structure is observed in WBCs.
- 6) Cell organelles Mitochondria is called a suicidal bag.

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

- a) Write short note on Cell differentiation
- b) Explain in brief, Gap junctions
- c) Describe in brief, neurotransmitters
- d) Write in brief on Regeneration in salamander limb

Q.3 Answer the following.

- a) Write in detail Cell Structure and organization of eukaryotic cells
- b) Explain in detail Ultrastructure & function of ribosomes

08**08****Q.4 Answer the following.**

- a) Describe in detail passive transport.
- b) Explain in detail structure and functions of microtubules, microfilaments and intermediate filaments.

08**08****Q.5 Answer the following.**

- a) Write an essay on Cell Cycle Phases of meiosis.
- b) Explain in brief Desmosomes and Hemidesmosomes.

10**06****Q.6 Answer the following.**

- a) Write an essay on Calcium as an intracellular messenger.
- b) Describe in brief Hedgehog pathway

10**06****Q.7 Answer the following.**

- a) Write an essay on strategies for monospermy and conservation of species specificity
- b) Explain in brief regeneration in planaria

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M.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023
BIOTECHNOLOGY
Enzyme Technology (MSC33202)

Day & Date: Sunday, 23-07-2023
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) _____ is the function of phosphorylase.
 - a) Transfer of inorganic phosphate
 - b) Transfer a carboxylate group
 - c) Use H₂O₂ as the electron acceptor
 - d) Transfer amino group

- 2) _____ of the following reaction is catalyzed by Lyase.
 - a) Breaking of bonds
 - b) Formation of bonds
 - c) Intramolecular rearrangement of bonds
 - d) Transfer of group from one molecule to another

- 3) _____ is not a catalytic strategy for an enzyme to perform specific reaction.
 - a) Covalent catalysis
 - b) Metal ion catalysis
 - c) Michaelis constant
 - d) Acid-base catalysis

- 4) _____ is an Isozyme.
 - a) Same structure, different function
 - b) Different structure, the same function
 - c) Same structure, the same function
 - d) Different structure, different function

- 5) In competitive inhibition, inhibitors bears a close structural similarity with the _____.
 - a) Co-enzyme
 - b) Co-factor
 - c) Prosthetic group
 - d) Substrate

- 6) Diminished delivery of oxygen to tissues is termed as _____.
 - a) Hypoxia
 - b) Ischemia
 - c) Homeostasis
 - d) Metabolism

SLR-SE-7

- 7) Transmembrane proteins belong to _____ class of proteins.
 - a) Peripheral proteins
 - b) Lipid-anchored proteins
 - c) Extrinsic proteins
 - d) Integral membrane proteins
- 8) _____ of the following proteins do not have alpha-helix in their transmembrane portion.
 - a) Rhodopsin
 - b) GPCRs
 - c) Glycophorins
 - d) Porins
- 9) Inhibition of invertase by sucrose falls into _____ category of inhibition.
 - a) Substrate inhibition
 - b) Non-competitive inhibition
 - c) Product inhibition
 - d) Competitive inhibition
- 10) _____ coined the word enzyme.
 - a) Wilhelm Kuhne
 - b) Alfred Russel
 - c) Robert Koch
 - d) Rosalind Franklin

B) Write true/false

06

- 1) The interior of beta-barrels in porins is hydrophilic.
- 2) Uncompetitive inhibition is most noticeable at low substrate concentration and can be overcome at high substrate concentration.
- 3) Product inhibition is a type of enzyme inhibition where the product of an enzyme reaction inhibits its production.
- 4) Ribozymes are catalytically active RNA molecules or RNA-protein complexes, in which solely the RNA provides catalytic activity.
- 5) An enzyme modulator is a type of drug which modulates substrate.
- 6) Uncompetitive inhibition is also known as anti-competitive inhibition.

Q.2 Answer the following. Add a note on the following

16

- a) Active centre and binding sites of enzymes.
- b) SGPT
- c) Specific activity of the enzyme
- d) SGOT

Q.3 Answer the following.

- a) Write a note on structural and functional properties of Lysozyme, ribonuclease, trypsin, carboxypeptidase and phosphorylase. 08
- b) Explain the kinetics and performance with particular emphasis on charge and hydrophobicity (pH, temperature and K_m) of enzyme. 08

Q.4 Answer the following.

- a) Describe in detail Hill and Scatchard plots and kinetics of allosteric enzymes. 08
- b) Explain the types and applications of enzyme inhibition. 08

Q.5 Answer the following.

- a) Write a note on Factors affecting enzyme activity. **08**
- b) Explain various methods of immobilization and its application. **08**

Q.6 Answer the following.

- a) What are biosensors? Explain in detail about the types of biosensors and their role in biomedical applications. **08**
- b) What is multienzyme complex? Describe their properties, role and advantages. **08**

Q.7 Answer the following.

- a) Add a note on the following: LDH isozymes, alpha amylase, SGPT and creatine kinase. **08**
- b) Explain in detail transition state theory and mechanisms of catalysis. **08**

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M.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023
BIOTECHNOLOGY
Molecular Cell Processing (MSC33206)

Day & Date: Tuesday, 25-07-2023
 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 amount of repetitive DNA in the genome was determined by _____.
 a) PCR
 b) chromatography
 c) Cot curve
 d) DPA method
- 2) The numerical equation for linking number _____.
 a) $Ln = Tw - Wr$
 b) $Lk = Tr + Tw$
 c) $Lk = Tw - Wr$
 d) $Lk = Tw + Wr$
- 3) The transcriptional gene control in eukaryotes is mediated by _____.
 a) metabolites that bind to the cis-acting elements
 b) trans-acting factors failing to bind to cis-acting elements
 c) trans-acting factors binding to cis-acting elements
 d) repressor proteins that bind to operator sites
- 4) _____ many histones are present in the core of a nucleosome.
 a) 8
 b) 6
 c) 4
 d) 2
- 5) _____ of the following enzymes separates the two strands of DNA during replication.
 a) Gyrase
 b) Topoisomerase
 c) Helicase
 d) DNA polymerase
- 6) DNA dependent RNA polymerase is involved in _____.
 a) DNA Replication
 b) Transcription
 c) RNA Replication
 d) Reverse Transcription
- 7) _____ inhibited by erythromycin.
 a) Replication
 b) Transcription
 c) Translation
 d) Reverse transcription
- 8) _____ of the following codon translate as proline.
 a) AGU
 b) CGA
 c) CCC
 d) AUG

- 9) _____ 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
- 10) _____ protein is required for repair and maintenance of DNA.
- Rease
 - Gyrase
 - LexA
 - RecA

B) Write true/false

06

- The unpacked stretches of DNA are the extra chromosomal load found in the eukaryotic genome.
- H3 and H4 histone pairs forms tetramers in solution.
- Ribosome begins its translation at the 3' end of the mRNA in prokaryotes.
- DNA polymerase III is used in prokaryotic replication.
- The primer used for lagging strand synthesis in prokaryotes is an RNA primer.
- Attenuator in the tryptophan operon is the leader sequence in the tryptophan mRNA coding for many tryptophan residues.

Q.2 Answer the followings.

16

- Give an account on euchromatin and heterochromatin.
- Describe the DNA replication inhibition.
- Describe the role of rec BCD pathway in E. coli.
- Give an account on Prokaryotic and eukaryotic ribosome

Q.3 Answer the followings.

- Explain different forms of DNA.
- Explain the repetitive DNA and unique sequences

08

08

Q.4 Answer the followings.

- Describe in detail the enzymes involved in prokaryotic DNA replication.
- Write a note on DNA proof reading and DNA methylation.

08

08

Q.5 Answer the followings.

- Explain in detail the structure and subunits of prokaryotic RNA polymerase.
- Discuss in detail about Reverse transcription.

08

08

Q.6 Answer the followings.

- Explain in detail post translational modification of proteins.
- Explain in detail the genetic code

08

08

Q.7 Answer the followings.

- Write a note on Holiday intermediate and Proteins involved in Recombination.
- Explain in detail the mutagens and DNA Repair by Photoreactivation.

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**M.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2023
BIOTECHNOLOGY**

Industrial and Environmental Biotechnology (MSC33301)

Day & Date: Monday, 10-07-2023

Max. Marks: 80

Time: 11:00 AM To 02:00 PM

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

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

- 1) Stirred Bioreactors are better because they have _____.
 - a) better aeration and mixing properties
 - b) foam control system
 - c) better temperature and pH control systems
 - d) All of the above
- 2) An open operation system with continuous addition and discharge of the solution in the system.

a) Batch	b) fed batch
c) Continuous	d) solid state
- 3) Fermentation to produce alcohol by yeast *saccharomyces* is due to _____.

a) Zymase	b) Galactose
c) Trysaccharide	d) Saccharide
- 4) Citric acid find application in _____.

a) ink making	b) printing
c) soft drinks	d) mineral water
- 5) Heat killing of all microorganism is done in the process called _____.

a) Immunization	b) Sterilization
c) Pasteurization	d) Mineralization
- 6) Anaerobic respiration of yeast produces _____.
 - a) alcohol
 - b) carbon dioxide
 - c) alcohol, carbon dioxide and other
 - d) O₂
- 7) A molecule that must combine with an endogenous protein to elicit reaction is called _____.

a) Antibody	b) Hapten
c) Biotechnology	d) Molecule

SLR-SE-10

Q.5 Answer the following.

- a) Write note on types and applications of biological indicators. **10**
- b) Describe the process of biotreatment of textile effluent, xenobiotics. **06**

Q.6 Answer the following.

- a) What is heavy Metal Pollution? Explain its impact on environment. **10**
- b) Write a note on biosensors in assessment of pollution. **06**

Q.7 Answer the following.

- a) Explain in detail about the role of biotechnology in creating the clean environment. **10**
- b) Describe various measurement and control systems of fermenter. **06**

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Set P

M.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2023
BIOTECHNOLOGY
Genetic Engineering (MSC33302)

Day & Date: Tuesday, 11-07-2023

Max. Marks: 80

Time: 11:00 AM To 02:00 PM

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

Q.1 A) Choose correct alternative.

10

- 1) The technique used to detect the labelled molecules is _____.
a) Autoradiography b) Phase contrast microscopy
c) Cell fractionation d) Tissue culture
- 2) Annealing temperature in PCR depends on _____.
a) Taq polymerase b) Primer
c) template DNA d) Buffer
- 3) _____ is used in construction of genomic library.
a) aDNA b) bDNA
c) cDNA d) zDNA
- 4) _____ are labelled in blotting technique.
a) DNA b) Probe
c) Membrane d) Buffer
- 5) An example for plasmid vector is _____.
a) M13 b) pBR322
c) BAC d) YAC
- 6) The DNA inserted with the gene of interest is called as _____.
a) cDNA b) bDNA
c) rDNA d) zDNA
- 7) VNTR are used in _____ technique.
a) DNA fingerprinting b) RAPD
c) AFLP d) RFLP
- 8) Di-dNTPs are major components of _____ technique.
a) RAPD b) DNA sequencing
c) Electroporation d) blotting
- 9) _____ is one of the selectable marker gene in plasmid vector.
a) Ori C b) MCS
c) LacZ d) Amp^r

SLR-SE-11

- 10) Restriction enzymes belongs to the class of _____ enzymes.
- a) Nuclease
 - b) Polymerase
 - c) Gyrase
 - d) Ligase

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

- 1) M13 is an example of _____ vector.
- 2) The sealing of DNA nick is done by _____ enzyme.
- 3) _____ are called as molecular scissors.
- 4) _____ plasmid is used for gene transfer in plants.
- 5) The blotting technique used for the detection of proteins is _____.
- 6) An example of insect resistant plant is _____.

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

- a) Add a note on classification of restriction endonucleases.
- b) Write a note on BAC and YAC with structure.
- c) Write a brief account molecular probes.
- d) Write a note on applications microarray technology.

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

- a) Write a note on DNA manipulating enzymes.
- b) Add a note on types of viral vectors with advantages.

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

- a) Explain the construction and screening of genomic library.
- b) Add an account on RAPD technique with applications.

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

- a) Add a note on methods of DNA sequencing.
- b) Write a note on types of gene transfer techniques.

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

- a) Explain methods for screening of recombinant cells.
- b) Write a note PCR and its types.

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

- a) Explain the technique of DNA fingerprinting.
- b) Add a note on production of recombinant insulin.

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M.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2023
BIOTECHNOLOGY
Plant Biotechnology (MSC33306)

Day & Date: Wednesday, 12-07-2023
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 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 correct alternative.

10

- 1) _____ is a polysaccharide derived from certain algae, and commonly used as a gelling agent in tissue culture media.
 - a) Sucrose
 - b) Macronutrients
 - c) Micronutrients
 - d) Agar
- 2) _____ is a macroelement required for plant nutrition.
 - a) Nitrogen
 - b) Zinc
 - c) Manganese
 - d) Copper
- 3) A nonsexual developmental process that produces a bipolar embryo with a closed vascular system from somatic tissues of a plant is called _____.
 - a) embryo culture
 - b) somatic embryogenesis
 - c) somaclonal variation
 - d) organ culture
- 4) _____ is one of the reasons proposed for the escape of the meristem from virus invasion.
 - a) Absence of the vascular system in the meristem
 - b) Meristem forms antibodies against viruses
 - c) Absence of auxin in the meristem
 - d) Low metabolic rate in meristematic cells
- 5) _____ has been the most favorite source of plant protoplasts.
 - a) Shoot
 - b) Root
 - c) Leaf
 - d) Zygote
- 6) _____ are substances added to freezing mixtures to protect cells from effect of freeze-drying.
 - a) Plasmolyticum
 - b) Osmoticum
 - c) Cryoprotectants
 - d) Fusagens
- 7) The use of a modified shotgun to accelerate small (1-4 μm) metal particles into plant cells at a velocity sufficient to penetrate the cell wall (~250 m/s) is known as _____.
 - a) Electroporation
 - b) Chemical - mediated gene transfer
 - c) Microinjection
 - d) Particle bombardment
- 8) _____ complex is sometimes dubbed as the firecracker complex.
 - a) T-DNA + VirB
 - b) T-DNA + VirD
 - c) Host DNA + histones
 - d) T-DNA +VirD2 + VirE2

- 9) _____ vaccine is when the antigen is expressed in the edible part of the plant.
- | | |
|---------------|-----------|
| a) Covax | b) Polio |
| c) Attenuated | d) Edible |
- 10) Plants producing recombinant antibodies are known as _____.
- | | |
|-----------------|--------------------|
| a) Plantibodies | b) Anti-bodies |
| c) MABs | d) Edible vaccines |

B) Write True or False.

06

- 1) Boron element complexes with mannitol, mannan, polymannuronic acid, and other constituents of cell walls and also involved in cell elongation and nucleic acid metabolism.
- 2) The process of embryo development is called embryogenesis.
- 3) Gametoclonal variation is a variation in phenotype, either genetic or epigenetic, expressed by gametoclones.
- 4) Complete Ti plasmid is transferred from the *Agrobacterium* to the infected plant at the wound site.
- 5) Golden rice is a variety of rice produced through genetic engineering to biosynthesize betacarotene.
- 6) Neomycin phosphotransferase expressed by *nptII* gene is a one of the reporter genes used for plant transformation.

Q.2 Answer the following

16

- a) Initiation and Maintenance of Suspension culture
- b) Shoot tip culture
- c) Symmetric and Asymmetric hybrids
- d) Particle bombardment

Q.3 Answer the following.

- a) Vector less or direct DNA transfer - Particle bombardment, electroporation
- b) Protoplast isolation and culture

08

08

Q.4 Answer the following.

- a) Principle and application of Somatic Embryogenesis.
- b) Purification strategies - oleosin partitioning technology.

08

08

Q.5 Answer the following.

- a) Functions & Deficiency, diseases of plant nutrients.
- b) Basics of Tumor formation and mechanism of T-DNA transfer.

08

08

Q.6 Answer the following.

- a) Mechanism of Action - Auxin.
- b) Pollen culture for production of Haploid Plants

10

06

Q.7 Answer the following.

- a) Lab setup of Plant Tissue Culture laboratory
- b) Metabolic engineering in Plants

10

06

- 9) The classic source of hematopoietic stem cells is _____.
a) Bone marrow b) Liver
c) Pancreas d) Kidney
- 10) Embryonic stem cells are derived from _____.
a) Egg b) Embryo
c) Fetus d) Mature organs

- Q.1 B) Write True or False. 06**
- 1) Use of laminar flow cabinets minimizes possibility of contamination by air borne microbes.
 - 2) Suspension cultures cannot be scaled up from a flask to a deep tank stirrer.
 - 3) The behavior of cell is a function of both the state of its internal machinery and local environment.
 - 4) Primary culture when subcultured becomes Adherent culture.
 - 5) Serum is the most commonly used biological fluid.
 - 6) Pig is a favourite animal for harvesting human organs.
- Q.2 Answer the following. 16**
- a) Define:
 - i) Monoclonal antibodies
 - ii) Cryopreservation
 - b) Explain the role of serum in culture media.
 - c) Write a note on Balanced Salt Solution.
 - d) Write note on Mesenchymal stem cells.
- Q.3 Answer the following.**
- a) Write in details the types of stem cells in gastrointestinal gland. 08
 - b) Write in details about organ culture. 08
- Q.4 Answer the following.**
- a) Write note on common cell contaminants. 08
 - b) Write note on maintenance of cell line 08
- Q.5 Answer the following.**
- a) Write in brief about Knock out Mice. 10
 - b) Explain in brief transgenic animal technology with the help of example. 06
- Q.6 Answer the following.**
- a) Explain in brief the bioprinting of tissues. 08
 - b) Explain briefly 3D cell culture. 08
- Q.7 Answer the following.**
- a) Explain in brief 'Scaling up the cell culture to large scale'. 08
 - b) Explain in brief the Hybridoma technology. 08

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M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2023
Biotechnology
Advanced analytical Techniques (MSC33402)

Day & Date: Wednesday, 12-07-2023
 Time: 03:00 AM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) Question no. 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 correct alternative.

10

- 1) _____ microscopy makes use of secondary electrons.
 - a) Electron
 - b) con focal
 - c) Fluorescence
 - d) Raman
- 2) Time of Flight is a principle of _____ technique.
 - a) IR
 - b) XRD
 - c) MALDI
 - d) CD
- 3) The type of IR radiation which deals with rotational energy is _____.
 - a) Near IR
 - b) Mid-IR
 - c) Far IR
 - d) All IR
- 4) Scintillation counting is the method based on _____.
 - a) Emission
 - b) Absorption
 - c) Excitation
 - d) Transmission
- 5) _____ technique is used to detect molecular weight of proteins.
 - a) SDS PAGE
 - b) Native PAGE
 - c) IEF
 - d) 2D PAGE
- 6) The stain used to trace the mobility of DNA in gel is _____.
 - a) Ethidium Bromide
 - b) Bromophenol blue
 - c) Commisive Brilliant Blue
 - d) Bromo cresol purple
- 7) Amino benzyloxymethyl filter paper is commonly used for transfer in _____.
 - a) Western blotting
 - b) Southern blotting
 - c) Northern blotting
 - d) Dot blotting
- 8) The collection of samples attached to solid phase in chromatography is called _____.
 - a) Elution
 - b) Emulsion
 - c) termination
 - d) tagging
- 9) The protein separation technique based on charge neutralization is _____.
 - a) SDS-PAGE
 - b) Native PAGE
 - c) IEF
 - d) Chromatography
- 10) The atom used for radio labelling in DNA molecule _____.
 - a) Carbon
 - b) Hydrogen
 - c) Phosphorus
 - d) Nitrogen

- B) Fill in the blanks.** **06**
- 1) Magnification power is used in _____.
 - 2) The sample holder in visible spectroscopy is called as _____.
 - 3) GLC stands for _____.
 - 4) The gel material used for vertical gel electrophoresis is _____.
 - 5) The DNA blotting technique was developed by _____.
 - 6) Mass to charge ratio is used in _____ technique.
- Q.2 Answer the following** **16**
- a) Add a note on principle of light microscopy.
 - b) Write a note on applications of HPLC.
 - c) Write a brief account on principle of electrophoresis.
 - d) Write a note on Spectro-fluorimetry.
- Q.3 Answer the following.** **16**
- a) Write a note on Phase contrast Microscopy.
 - b) Write the principle and working of Gel filtration chromatography.
- Q.4 Answer the following.** **16**
- a) Explain the principle and procedure of SDS-PAGE.
 - b) Add an account on Northern blotting technique with applications.
- Q.5 Answer the following.** **16**
- a) Add a note on types of electromagnetic waves with mode of interaction
 - b) Explain the principle and instrumentation of NMR spectroscopy.
- Q.6 Answer the following.** **16**
- a) Explain the instrumentation and applications of Colorimetry
 - b) Add a note on principle and applications of Iso electric focusing.
- Q.7 Answer the following.** **16**
- a) Add a note on types and applications of centrifugation technique.
 - b) Define radioactivity. Add a note on preparation and detection of radio isotopes.

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**M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2023
Biotechnology**

Research Methodology and Intellectual Property Rights (IPR) (MSC33403)

Day & Date: Friday, 14-07-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) Question no. 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) _____ is the purpose of doing research.
 - a) To identify problem
 - b) To publish paper
 - c) To publish book
 - d) To utilize chemicals
- 2) The data of research is _____.
 - a) Only quantitative
 - b) Semi Qualitative
 - c) Qualitative & Quantitative
 - d) Aimless
- 3) Sampling error can be reduced by _____.
 - a) Non-probability sampling
 - b) Increasing the population
 - c) Decreasing the sample size
 - d) Increasing the sample size
- 4) Plagiarism can be avoided by _____.
 - a) Copying the work of others accurately
 - b) Paraphrasing the author's text in your own words
 - c) Cut and pasting from the Internet
 - d) Quoting directly without revealing the source
- 5) A result is called "statistically significant" whenever _____.
 - a) The null hypothesis is true
 - b) The alternative hypothesis is true
 - c) The p-value is less or equal to the significance level
 - d) The p-value is larger than the significance level
- 6) _____ part of a research report contains details description of experiment was planned and conducted.
 - a) Results
 - b) Design
 - c) Introduction
 - d) Method
- 7) The _____ technology transfer can be done within an institution or company.
 - a) Personal
 - b) private
 - c) Intramural
 - d) extramural
- 8) If a plant variety is clearly distinguishable by at least one essential characteristic is said to be _____.
 - a) Novel
 - b) distinct
 - c) Uniform
 - d) stable

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**M.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2023
BIOTECHNOLOGY**

Medical Biotechnology and Bionanotechnology (MSC33406)

Day & Date: Sunday, 16-07-2023

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) In glucose electrode, glucose oxidase has been coupled to an electrode by _____.
a) Ferrocene derivatives b) Urease
c) Polyacrylamide d) Biochips
- 2) 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
- 3) _____ antibiotic has a beta-lactam ring.
a) Cephalosporin b) Penicillin
c) Tetracycline d) Streptomycin
- 4) The origin and development of a disease is called _____.
a) Pathogenesis b) Transgenic
c) Peptides d) Pharmcogenetics
- 5) The assessment of hundreds, thousands or even millions of molecule samples is called _____.
a) Screening b) Medicine
c) Vaccine d) Immunity
- 6) _____ does not represent a human disease caused by fungi.
a) Ring worm b) Cryptococcosis
c) Malaria d) Jock itch
- 7) Staphylococcus spp produces _____ enzyme.
a) Proteases b) Lipase
c) Hyaluronidase d) Coagulase
- 8) The colour of the nano gold particles is _____.
a) Yellow b) Orange
c) Red d) Variable

