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M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
BIOTECHNOLOGY
Biochemistry and Enzymology (2311101)

Day & Date: Friday, 05-01-2024
 Time: 03:00 AM 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.

08

- 1) Complex 4 is also known as _____.
 a) cytochrome oxidase
 b) NADH hydrogenase
 c) Succinate dehydrogenase
 d) cytochrome bc 1 complex
- 2) Which of the following is the source of electrons in photosynthesis.
 a) NADH, b) Water
 c) Carbohydrates d) CO₂
- 3) Which of the following enzymes is secreted by the pancreas.
 a) Myoglobin b) Cytochrome
 c) Ribonuclease d) Lysozyme
- 4) The type of reaction center in the photosystem II is _____.
 a) Iron-Sulphur b) Quinone-type reaction centre
 c) Oxygen d) Iron
- 5) Which of the following is the simplest form of carbohydrates.
 a) Carboxyl group
 b) Aldehyde and Ketone group
 c) Alcohol and carboxyl group
 d) Hydroxyl and hydrogen group
- 6) Which of the following is the general formula of carbohydrates.
 a) (C₄H₂O)_n b) (C₆H₂O)_n
 c) (CH₂O)_n d) (C₂H₂O)_n COOH
- 7) Which of the following is the example of epimers
 a) Glucose and Ribose
 b) Glucose and Galactose
 c) Galactose, Mannose, Glucose
 d) Glucose, Ribose Mannose
- 8) Commonly Benedict's reagent is used for estimation of _____.
 a) Carbohydrates b) DNA
 c) RNA d) Lipids

- B) Write True/False** **04**
- 1) Protein folding is a type of post translational modification.
 - 2) Gap junctions are not constructed of transmembrane proteins.
 - 3) Mutagens can cause permanent damage to genetic material.
 - 4) The cell wall is present in prokaryotes.
- Q.2 Answer the following (Any Six)** **12**
- a) Explain cell theory.
 - b) Write the properties of genetic code.
 - c) Write a note on tight junction.
 - d) Give the significance Rec A.
 - e) What is Sigma factor?
 - f) What is Satellite DNA?
 - g) What are transcriptional factors? Give example.
 - h) Give the role of enzyme gyrase in DNA replication process.
- Q.3 Answer the following (Any Three)** **12**
- a) Explain the structure and function of Nucleus.
 - b) Explain the process of DNA repair by Photoreactivation.
 - c) What is DNA super coiling? Add a note on gyrase and its function?
 - d) Explain role of Cyclins and Cdks in cell cycle.
- Q.4 Answer the following (Any Two)** **12**
- a) Give an account on cell cycle and its regulation.
 - b) Write a note on Ras-Map Kinase Pathway.
 - c) Comment on the role of nuclear matrix in chromosome organization.
- Q.5 Answer the following (Any Two)** **12**
- a) Give detail account on fluid mosaic model of plasma membrane.
 - b) Write note on mismatch and SOS repair.
 - c) Explain the process of prokaryotic translation.

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M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
BIOTECHNOLOGY
Biostatistics and Bioinformatics (2311107)

Day & Date: Tuesday, 09-01-2024
 Time: 03:00 PM To 05:30 PM

Max. Marks: 60

Instructions: 1) All Questions are compulsory.
 2) Figure to right indicate full marks.

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

08

- 1) Synonym of Ramachandran plot _____ is?
 - a) Rama plot
 - b) Ramachandran diagram
 - c) $[\phi, \psi]$ plot
 - d) All of the above
- 2) _____ is an online bioinformatics resource operated by the SIB Swiss Institute of Bioinformatics.
 - a) Expasy
 - b) Equinox
 - c) Equity
 - d) Equi join
- 3) _____ varieties are used for multiple sequence alignment, phylogenetic tree construction, and as input for protein structure prediction.
 - a) Expasy
 - b) Equinox
 - c) Clustal
 - d) All of these
- 4) _____ tool is used for phylogenetic analysis.
 - a) Mega
 - b) Omega
 - c) Alpha
 - d) Above all
- 5) _____ are libraries of biological sciences, collected from scientific experiments, published literature.
 - a) Google
 - b) Biological databases
 - c) Yahoo
 - d) All of these
- 6) Structures available in the _____ include RNA and DNA oligonucleotides.
 - a) PDB
 - b) NDB
 - c) Gene Bank
 - d) All of these
- 7) _____ is simply the average of the given set of values.
 - a) Ratio
 - b) Summation
 - c) Mean
 - d) Attribute
- 8) In statistics, a _____ is the pool of individuals from which a statistical sample is drawn for a study.
 - a) Graph
 - b) Population
 - c) Sample
 - d) Tree

B) Write True /False.

04

- 1) BLAST stands for the Basic Local Alignment Search Tool.
- 2) Frequency distribution is a representation of the frequency of occurrence of each possible outcome of a variable.
- 3) There are two main methods for constructing phylogenetic trees: distance-based and character-based methods.
- 4) Bayesian neural networks are a popular type of neural network due to their ability to quantify the uncertainty in their predictive output.

- Q.2 Answer the following. (Any Six) 12**
- a) What is Global alignments and its technique?
 - b) What are two main methods for constructing phylogenetic trees and discuss in a line?
 - c) Discuss briefly about NDB.
 - d) What is the difference between Bioinformaticist versus Bioinformatician?
 - e) How do search engines work?
 - f) What contents are available at PubMed?
 - g) Write a brief note on NCBI.
 - h) Write full form of EMBL & DDBJ
- Q.3 Answer the following. (Any Three) 12**
- a) Give longform of SOPMA and write a short note.
 - b) Write a note on primary protein structure prediction.
 - c) How to perform multiple sequence analysis Clustal tool?
 - d) Define and explain Standard deviation in brief.
- Q.4 Answer the following. (Any Two) 12**
- a) Write a note on P-value of the statistic.
 - b) Write a note on Algorithms in Sequence analysis methods.
 - c) Write a note on Validation of 3-D structure.
- Q.5 Answer the following. (Any Two) 12**
- a) Discuss briefly about Homology based modelling.
 - b) Calculate standard deviation from given data set {10, 20, 30, 40, 50}.
 - c) Discuss about Primary Protein sequence databases.

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M.Sc. (Semester - I) (New) (NEP CBCS) Examination: Oct/Nov-2023
BIOTECHNOLOGY
Research Methodology (2311103)

Day & Date: Thursday, 11-01-2024

Max. Marks: 60

Time: 03:00 PM To 05:30 PM

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

Q.1 A) Choose correct alternative. 08

- 1) Which of the following is the first step in starting the research process?
 - a) Searching sources of information to locate the problem.
 - b) Survey of related literature.
 - c) Identification of the problem.
 - d) Searching for solutions to the problem.
- 2) The data acquired from the internet or medical record is _____ data.
 - a) Primary
 - b) Qualitative
 - c) Ordinary
 - d) Secondary
- 3) ISBN consists of how many digits _____.
 - a) 13
 - b) 2
 - c) 5
 - d) All of the above
- 4) 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
- 5) In a study, subjects are randomly assigned to one of three groups: control, experimental A, or experimental B. After treatment, the mean scores for the three groups are compared. The appropriate statistical test for comparing these means is:
 - a) the correlation coefficient
 - b) chi-square
 - c) the t-test
 - d) the analysis of variance
- 6) 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

- 7) The sources you used in your research.
 - a) Sources
 - b) References
 - c) Literature
 - d) Results
- 8) What does the findings section highlight?
 - a) The success of the study.
 - b) Psychological interpretation of the statistical findings.
 - c) Outcome of data analysis.
 - d) All of these

Q.1 B) Fill in the blanks OR write true/false. 04

- 1) The methods section tells readers how you conducted your study.
 - a) True
 - b) False
- 2) Anova and chi square can be used for statistical significance in any research.
 - a) True
 - b) False
- 3) Saving, exchanging, selling and using farm-saved seeds are part of Farmers' Rights.
 - a) True
 - b) False
- 4) A trademark is known to protect logos, names and brands.
 - a) True
 - b) False

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

- a) What are farmer rights.
- b) Explain what is meant by ANOVA.
- c) What is sampling.
- d) Explain the fundamental research.
- e) What is report writing.
- f) What is referencing.
- g) Explain the term patent.

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

- a) Write a short note in the appendices.
- b) Explain the role of referencing.
- c) What is meant by a bibliography.
- d) Explain what variance and correlation.

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

- a) Explain the types and uses of audio-visual aids in the presentation.
- b) Write in detail about the funding agencies like DBT and ICMR.
- c) Explain what is meant by report writing and mention the types of report writing.

Q.5 Answer the following. (Any Two)

- a) Explain in detail what is meant by IMRAD.
- b) Write in detail the research design and explain the formulation of the hypothesis.
- c) Explain the patenting of biological material with examples and case studies.

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M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
BIOTECHNOLOGY
Microbiology (MSC33101)

Day & Date: Friday, 05-01-2024
 Time: 03:00 PM To 06:00 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) Figures to the right indicate full marks.

Q.1 A) Choose correct alternative. 10

- 1) _____ is known as the father of Microbiology.
 - a) Edwin John Butler
 - b) Ferdinand Cohn
 - c) Robert Koch
 - d) Antoni van Leeuwenhoek
- 2) _____ is/are photosynthetic in nature.
 - a) Cyanobacteria, Fungi and Viruses
 - b) Viruses
 - c) Cyanobacteria
 - d) Fungi
- 3) _____ found in soil is responsible for production of antibiotics.
 - a) Fungi
 - b) Bacteria
 - c) Protozoa
 - d) Nematodes
- 4) *Nipah henipavirus* is a _____ borne virus.
 - a) Water
 - b) Bat
 - c) Air
 - d) Food
- 5) _____ bacteria appears purple-violet colour after staining.
 - a) Gram-positive
 - b) Gram-negative
 - c) Both Gram-positive and Gram-negative
 - d) Neither Gram-positive nor Gram-negative
- 6) _____ shows zygotic meiosis.
 - a) *Chlamydomonas*
 - b) *Marchantia*
 - c) *Funaria*
 - d) *Fucus*
- 7) The protein coat of viruses that enclose the genetic material is called _____.
 - a) Virion
 - b) Capsid
 - c) Peplomers
 - d) Capsomers
- 8) Following statements is true about a virion _____.
 - a) Lytic phage
 - b) Lysogenic phage
 - c) The viral capsid
 - d) An infectious and fully formed viral particle
- 9) _____ is the association of viral DNA with the bacterial chromosome.
 - a) gene
 - b) prophage
 - c) plasmid
 - d) plaque
- 10) Spore formation in cellular slime mould takes place in _____.
 - a) Plasmodium
 - b) Sporangium
 - c) Sporophore
 - d) Pseudo plasmodium

- B) Write whether the following statement is true or false:** **06**
- 1) Safranin is added at last during Gram-Staining.
 - 2) Mannitol is not a food reserve of Rhodophyceae.
 - 3) Capsomere is made up capsid.
 - 4) Influenza has ds RNA.
 - 5) Physarum is the example of slime mould.
 - 6) Parvo virus has ss DNA.

- Q.2 Write Short Notes** **16**
- a) Write a note on modern methods of prokaryotes identification.
 - b) Write the general characters of oxygenic and anoxygenic photosynthetic microbes.
 - c) Define culture media and write its types.
 - d) Write the general properties of viruses.

- Q.3 Answer the following.**
- a) Describe in brief about traditional and modern methods of bacterial identification. **08**
 - b) Write in brief about: **08**
 - 1) Acidophiles
 - 2) Alkalophiles
 - 3) Thermophiles
 - 4) Halophiles

- Q.4 Answer the following.**
- a) Describe in detail about types of culture media. Give the appropriate composition of any one media. **08**
 - b) Describe in detail about reproduction in microorganisms. **08**

- Q.5 Answer the following.**
- a) What are the industrial applications of microorganisms? **08**
 - b) Describe in brief about subvirak particles. **08**

- Q.6 Answer the following.**
- a) Write a note on major bacterial culture collection units. **06**
 - b) Write a detail account on microbial staining techniques. **10**

- Q.7 Answer the following.**
- a) Write in brief about Lytic and Lysogenic cycle. **06**
 - b) Write a detail account on microbial isolation techniques and add a note on its necessity. **10**

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M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
BIOTECHNOLOGY
Concept of Biochemistry (MSC33102)

Day & Date: Sunday, 07-01-2024

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) 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
- 2) Each cycle of β - oxidation liberates a two carbon unit of _____ CoA.
 - a) Acetyl
 - b) Butyryl
 - c) Acyl
 - d) Malonyl
- 3) Hypoglycemia is the condition with _____ blood glucose concentration.
 - a) high
 - b) low
 - c) moderate
 - d) no
- 4) Coris and Pomes diseases are disorders of _____ storage.
 - a) starch
 - b) cellulose
 - c) peptidoglycan
 - d) glycogen
- 5) In noncyclic photophosphorylation, there is participation of _____ photosystems.
 - a) One
 - b) Two
 - c) Three
 - d) Four
- 6) Kwashiorkar and Marasmus are disorders of _____ metabolism.
 - a) protein
 - b) lipid
 - c) lactose
 - d) cholesterol
- 7) Elevated levels of _____ is used as a diagnostic tool for pregnancy.
 - a) GIH
 - b) HCG
 - c) TSH
 - d) ADH
- 8) The sucrose biosynthesis in plants results from condensation of fructose 6 phosphate with the _____ glucose.
 - a) ADP
 - b) GDP
 - c) NADP
 - d) UDP
- 9) Cellulose is different from amylose in having the presence of _____ linkage.
 - a) peptide
 - b) disulfide
 - c) alpha 1,4
 - d) beta 1, 4

- 10) Glycolysis and gluconeogenesis are regulated mainly under the action of hormones _____.
a) Estrogen and progesterone b) Insulin and glucagon
c) FSH and ACTH d) Thyroxin and oxytocin

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

- 1) Glycolysis has _____ irreversible steps.
- 2) In gout's disease there is accumulation of _____ acid in the joints.
- 3) Formation of _____ COA is the rate limiting step in fatty acid biosynthesis.
- 4) ETC is located in _____.
- 5) Ornithine is an intermediate of _____ cycle.
- 6) In Obesity, negative effects on health are due to the excessive accumulation of _____.

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

- a) State laws of thermodynamics. What is Free energy?
- b) Draw chemical structure of any two disaccharides.
- c) Define hormone. Give general classification of hormones.
- d) Explain the levels of organization in protein structure.

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

- a) Describe reactions, energetics and regulation of glycolysis.
- b) Describe diabetes as a metabolic disorder.

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

- a) Describe the hormonal control of pregnancy and lactation.
- b) Differentiate between light and dark reactions of photosynthesis.

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

- a) Describe reactions, energetics and regulation of TCA cycle.
- b) Describe the structure and role of cAMP as a secondary messenger.

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

- a) Write an account on cyclic and noncyclic photophosphorylation.
- b) Describe any two plant growth hormones.

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

- a) Write an account on Urea cycle.
- b) Write an account on Electron Transport Chain.

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M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
BIOTECHNOLOGY
Inheritance Biology (MSC33103)

Day & Date: Tuesday, 09-01-2024
 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) Genotype of dominant plant can be determined by _____.
 a) Pedigree analysis b) Back cross
 c) Test cross d) Dihybrid cross
- 2) Crossing over occurs between _____.
 a) Non sister chromatids of non-homologous chromosome at Zygotene stage of prophase -I
 b) Non sister chromatids of non-homologous chromosomes at pachytene stage of prophase I
 c) Non sister chromatids of homologous chromosomes at pachytene stage of prophase I
 d) Non sister chromatids of homologous chromosomes at zygotene stage of prophase I
- 3) The number of linkage groups in the Drosophila _____.
 a) Two b) Four
 c) Eight d) Ten
- 4) The sex linked disease is _____.
 a) Hepatitis b) Leukemia
 c) Malignancy d) Color Blindness
- 5) Introduction of DNA into cells by exposing to high voltage electric pulse is _____.
 a) electrofusion b) electrofusion
 c) electrolysis d) electroporation
- 6) The statement that describes the Hardy Weinberg law the best is _____.
 a) it is impossible to predict expected allele frequencies mathematically.
 b) in large population dominant alleles become more prevalent.
 c) allele frequency changes over a period in a large population.
 d) mechanism of inheritance in a large population does not change allele frequency.
- 7) 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

- 8) Viruses which cause lysis of bacteria are known as _____.
 - a) lysogenic
 - b) lytic
 - c) lipolytic
 - d) lysozymes
- 9) Lampbrush Chromosomes occur in _____.
 - a) Oocytes
 - b) Cancer cells
 - c) Lymph glands
 - d) Salivary glands
- 10) DNA solution injected directly into the cell using micromanipulators is called _____.
 - a) Microinjection
 - b) Micromanipulator mediated DNA delivery.
 - c) Microfection
 - d) None of these

B) Fill in the blanks.

06

- 1) If a hybrid expresses a character, it is called _____.
- 2) In most species, mitochondrial DNA is passed down from _____.
- 3) The number of linkage groups in *Drosophila* _____.
- 4) _____ number of factors affects the Hardy Weinberg principle.
- 5) _____ called equational division.
- 6) The number of contrasting characteristics of pea plant Mendel considered for his experiment _____.

Q.2 Answer the following.

16

- a) What is allele? Explain in its types.
- b) Discuss about the screening of mutations methods based on phenotypes.
- c) Difference between Heterochromatin and euchromatin.
- d) Define Genetic Transformation and explain any two artificial transformation method.

Q.3 Answer the following.

- a) Write a note on Hardy-Weinberg genetic equilibrium and causes of changes in allele frequency. **10**
- b) Explain about the Mendelian laws of Dominance, Co-dominance and Incomplete dominance. **06**

Q.4 Answer the following.

- a) What are Hypomorphy? And discuss about the mapping method for the screening for mutations. **10**
- b) Describe in details of Chromosomal aberrations, deletion, duplication, inversion and translocation. **06**

Q.5 Answer the following.

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

Q.6 Answer the following.

- a) Define Chromosomes and explain the chloroplast, mitochondria and plasmid extra chromosomal inheritance. **10**
- b) Describe in details about the matting type switching of *Saccharomyces cerevisiae* yeast model. **06**

Q.7 Answer the following.

- a) What are bacteriophages? Discuss about the discovery, structure of lambda and T4 phage. **10**
- b) Define Population genetics and explain the gene frequency and factors influencing. **06**

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Set P

M.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2023
BIOTECHNOLOGY
Biostatistics and Bioinformatics (MSC33108)

Day & Date: Thursday, 11-01-2024

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

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

Q.1 A) Choose correct alternative. 10

- 1) Group of individuals taken for study is called _____.
 a) block b) population
 c) group d) flock

- 2) _____ is a representation, either in a graphical or tabular format, that displays the number of observations within a given interval.
 a) EMBL b) DDBJ
 c) GeneBank d) Frequency distribution

- 3) _____ is a one of the measures of dispersion.
 a) Variance b) Mean
 b) Median d) Mode

- 4) _____ is a statement regarding an unknown population parameter which we get from some previous data or past experience.
 a) Regression b) Hypothesis
 c) Probability d) Distributions

- 5) Which one of the following is an example of a Homology and similarity tool?
 a) RasMol b) BLAST
 c) PROSPECT d) EMBOSS

- 6) _____ is a free search engine accessing primarily the MEDLINE database of references and abstracts on life sciences and biomedical topics.
 a) PubMed b) Variance
 c) Probability d) Range

- 7) _____ is one of the Protein sequence databases.
 a) Swiss-PROT b) EMBL
 c) DDBJ d) GeneBank

- 8) _____ is an organized collection of data, generally stored and accessed electronically from computer system.
 a) Web b) Internet Protocol
 c) Database d) HTTP

- 9) _____ is not a 3D structure visualization tool.
 a) RasMol b) Jmol
 c) PyMol d) BLAST
- 10) _____ is a diagram that shows the evolutionary relationships between organisms.
 a) Mean b) phylogenetic tree
 c) BLAST d) FASTA

B) Write True / False. 06

- 1) The magnitude of the correlation coefficient indicates the strength of the association.
- 2) Probability is used to determine mean.
- 3) In finite Population, the number of elements of the population is fixed.
- 4) GenBank is a protein sequence database.
- 5) BLAST and FASTA are used for pairwise sequence analysis.
- 6) RasMol is one the 3D structure visualization tools.

Q.2 Write short notes on the following. 16

- a) Tabulation of data
- b) Scatter plot
- c) Introduction to NCBI and search engine
- d) BLAST

Q.3 Answer the following.

- a) Write a detailed account on measures of Central tendency. 10
- b) Write a comparative account on phylogenetic analysis tools - Phylip and MEGA. 06

Q.4 Answer the following.

- a) Write about primary protein structure prediction. 08
- b) Write about 3D structure visualization tools. 08

Q.5 Answer the following.

- a) Write a detailed account on measures of dispersion. 10
- b) Describe Pairwise sequence analysis. 06

Q.6 Answer the following.

- a) Define Sample and explain sampling methods. 08
- b) Write a brief account on correlation and explain its types. 08

Q.7 Answer the following.

- a) Discuss in detail - Phylogenetic analysis. 08
- b) Write a brief account on probability and explain related terms. 08

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Set **P**

M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
BIOTECHNOLOGY
Cell Biology (MSC33201)

Day & Date: Monday, 18-12-2023
 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) Rewrite the sentences using correct alternative given below: 10

- 1) Which of the following statements is true about cell theory?
 - a) The Cell theory does not apply to fungi
 - b) The Cell theory does not apply to algae
 - c) The Cell theory does not apply to microbes
 - d) The Cell theory does not apply to virus
- 2) _____ type of cell motility allows microorganisms to travel along the surface of low aqueous films.
 - a) Swarming
 - b) Gliding
 - c) Crawling
 - d) Swimming
- 3) The glycosaminoglycans in extracellular matrix are made of following sugars except _____.
 - a) N-acetylglucosamine
 - b) N-acetylmuramic acid
 - c) N-acetylgalactosamine
 - d) glucuronic acid
- 4) Which of the following statements is true about the Golgi bodies?
 - a) It is a sac-like organelle
 - b) It is located near the nucleus
 - c) It helps in transporting the particles throughout the cell
 - d) All of the above
- 5) Homologous chromosomes are separated during _____.
 - a) Metaphase I
 - b) Anaphase I
 - c) Metaphase II
 - d) Anaphase II
- 6) In $\text{Na}^+ - \text{K}^+$ ATPase mechanism, the transport mechanism is _____.
 - a) 2 Na^+ out; 3 K^+ in
 - b) 3 Na^+ out; 2 K^+ in
 - c) 3 K^+ out; 2 Na^+ in
 - d) 2 K^+ out; 3 Na^+ in
- 7) For a typical rapidly proliferating human cell with a total cycle time of 24 hours, the S-phase lasts for _____.
 - a) 11 hrs.
 - b) 8 hrs.
 - c) 1 hrs.
 - d) 4 hrs.
- 8) Metaphase arrest was induced by a cytoplasmic factor present in the egg is called as _____.
 - a) MPF
 - b) cytostatic factor (CSF)
 - c) progesterone
 - d) growth factor

- 9) _____, a protein pigment that absorbs red and far-red light most strongly, but that also absorbs blue light.
- a) Phytochrome
 - b) Cryptochrome
 - c) Phototropin
 - d) Chlorophyll
- 10) The zygotes divides in series to produce 8-16 celled compact structure called _____.
- a) blastula
 - b) morula
 - c) gastrula
 - d) fetal mass

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

- 1) Selectins with carbohydrates produces stable cell junction.
- 2) The motor protein involved in heart contraction is myosin.
- 3) The lipid in membrane structure is often polar in nature.
- 4) Rudolf Virchow, a German pathologist proposed the cell theory.
- 5) The cell which has power to differentiate into any kind of cell type of organism and even develops in to whole organism is called as Totipotent.
- 6) Cell organelles Nucleus is called the powerhouse of the cell.

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

- a) Apoptosis
- b) Quorum sensing
- c) Cell theory
- d) Regeneration in hydra

Q.3 Answer the following.

- a) Explain in detail Cell Structure and organization of prokaryotic.
- b) Describe in detail ultra structure & function of mitochondria.

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

- a) Explain in detail composition, structure and functions of cell membrane.
- b) Describe in detail Active transport.

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

- a) Write an essay on Cell Cycle Phases of mitosis.
- b) Describe in brief cell-cell interactions.

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

- a) Write an essay on signal transduction pathway- Regulation of Glucose levels.
- b) Explain in brief Ras-MAP Kinase pathway.

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

- a) Write an essay on cellular and biochemical processes during early fertilization.
- b) Describe in brief regeneration in salamander limb.

10**06**

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

Day & Date: Tuesday, 19-12-2023
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) Multiple Choice Questions choose correct alternative.

10

- 1) The nature of an enzyme is _____.
 - a) Vitamin
 - b) Lipid
 - c) Carbohydrate
 - d) Protein
- 2) _____ of the following function is catalyzed by Racemases.
 - a) Removal of water
 - b) Intramolecular transfer of a functional group
 - c) Interconversion of L and D stereoisomers
 - d) Inversion of asymmetric carbon-atom
- 3) _____ is the SI unit of enzyme activity.
 - a) Km
 - b) Kat
 - c) Kcat
 - d) Vmax
- 4) _____ of the following 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
- 5) Holoenzyme is made of _____.
 - a) Apoenzyme and Zymogen
 - b) Apoenzyme and Cofactors
 - c) Co-enzyme and Prosthetic group
 - d) Prosthetic group and Co-factor
- 6) Enzyme exist in the cells as _____.
 - a) Solid
 - b) Crystals
 - c) Colloid
 - d) soluble
- 7) _____ of the following type of metabolites is used for generating glucose under severe starvation conditions.
 - a) Amino acids
 - b) Fats
 - c) Glycogen
 - d) Starch

SLR-EE-13

- 8) _____ of the following is not a transmembrane protein.
- a) Bacteriorhodopsin
 - b) GPCR
 - c) Glycophorin
 - d) G protein
- 9) Substances which reduce the rate of enzyme catalyzed reactions are known as _____.
- a) substrates
 - b) enzymes
 - c) products
 - d) inhibitors
- 10) _____ is an enzyme that is derived from the stomachs of young ruminant animals and also used in dairy industry to produce cheese.
- a) Trypsin
 - b) Pepsin
 - c) Liginase
 - d) Rennin

B) Write true/false

06

- 1) When an enzyme catalyzing a reaction involving two substrates and yields one product is called as biosubstrate reaction.
- 2) Immobilized enzymes are physically confined or localized in a certain defined region of space with retention of their catalytic activities, and which can be used repeatedly and continuously.
- 3) Lysozyme is a naturally occurring enzyme found in bodily secretions such as tears, saliva, and milk
- 4) The Scatchard plot is generally used to determine the affinity of the receptor for its ligand and the number of binding sites.
- 5) A covalent bond is formed by unequal sharing of electrons from both the participating atoms.
- 6) Abzymes are with variable regions possessing antibodies enzymatic activity

Q.2 Answer the following.

16

- a) Explain the process of stereospecificity and ES complex formation.
- b) Explain in brief the Michaelis-Menten Equation - form and derivation.
- c) Describe the product inhibition and feedback control mechanism of enzymes
- d) Write a note Enzyme Catalysis.

Q.3 Answer the following.

- a) Explain the types of Enzyme inhibition in detail. 08
- b) Write a note on Isoenzymes, Ribozymes, Abzymes and Multienzyme complex. 08

Q.4 Answer the following.

- a) Describe the principle of Immobilized Enzymes and explain about their relative practical applications and industrial use, 08
- b) Explain the process involved in enzyme regulation. 08

Q.5 Answer the following.

- a) Explain the importance of enzymes in clinical aspects. **08**
- b) What metabolic engineering? Explain the process of metabolic engineering. **08**

Q.6 Answer the following.

- a) Write a note history, classification and nomenclature of enzymes **08**
- b) Define Biosensors. Write a note on the mechanism of action and application of biosensors. **08**

Q.7 Answer the following.

- a) Write a note on the significance importance of metabolic engineering and enzyme engineering in biotechnology. **08**
- b) What is Enzyme activity? Explain in detail about the principle involved in determination of enzyme activity. Add a note on specific activity. **08**

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**M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
BIOTECHNOLOGY**

Molecular Cell Processing (MSC33206)

Day & Date: Wednesday, 20-12-2023
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 Choose Question choose correct alternative. 10

- 1) The tau subunit is present in _____ polymerase.
 - a) DNA Pol I
 - b) DNA Pol II
 - c) DNA Pol III
 - d) RNA Pol I
- 2) If adenine residues =120, cytosine residues =120. Therefore total number of nucleotides in DNA is _____.
 - a) 240
 - b) 280
 - c) 440
 - d) 480
- 3) _____ of the following is true about reverse transcriptase.
 - 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) IPTG is an inducer of _____ operon.
 - a) ara
 - b) His
 - c) trp
 - d) lac
- 5) _____ of the following enzyme is involved in base excision repair.
 - a) Gyrase
 - b) Ligase
 - c) DNA glycosylases
 - d) Phytase
- 6) 33° twist angle; 2.3nm helix diameter; 0.26 nm axial rise; 28° helix pitch; 20° base-pair tilt is the characteristics of _____ form of DNA.
 - a) A
 - b) B
 - c) Z
 - d) C
- 7) ATP, UTP GTP and CTP serve as raw materials for synthesis of _____.
 - a) DNA
 - b) RNA
 - c) Protein
 - d) cDNA
- 8) 23S RNA is present in _____ subunit.
 - a) 30S
 - b) 50S
 - c) 60S
 - d) 40S
- 9) _____ of the following three codons translate as serine.
 - a) UAG
 - b) CGA
 - c) CAU
 - d) AUG

- 10) If the mutation has a negligible effect on the function of a gene, it is known as a ____.
- a) Silent mutation
 - b) Frame shift mutation
 - c) Substitution mutation
 - d) Insertion mutation

B) Write true/false. 06

- 1) Only a single stranded RNA can pass through the ribosome for decoding.
- 2) In the case of lac operon, interaction of repressor with operator inhibits the gene expression.
- 3) The origin of replication is rich in A and T.
- 4) Multiple origin of replication are present in the *E.coli* genome.
- 5) The first amino acid to be incorporated in the eukaryotic polypeptide is methionine.
- 6) Sickle cell anemia is a disease caused by missense mutation.

Q.2 Answer the following. 16

- a) Give an account on A form and B form DNA.
- b) Describe the eukaryotes polymerases involved DNA replication.
- c) Describe the proteins involved in Recombination.
- d) Give a brief account on aminoacyl tRNA synthetase.

Q.3 Answer the following.

- a) Explain eukaryotic genome organization using solenoid model. 08
- b) Explain Hershey and Chase experiment to prove DNA as a genetic material. 08

Q.4 Answer the following.

- a) Give an account on the DNA proof reading, DNA methylation and DNA replication inhibition. 08
- b) Write a note on prokaryotic DNA Polymerase I, II and III. 08

Q.5 Answer the following.

- a) Explain in detail lac operon with its regulation. 08
- b) Discuss in detail about Repressors, Activators, Enhancers, Promoter, Structural genes, and terminator elements. 08

Q.6 Answer the following.

- a) Explain in detail Prokaryotic and eukaryotic ribosomes with their subunits. 08
- b) Explain in detail the genetic code with its properties. 08

Q.7 Answer the following.

- a) Write a note on SOS and Recombination repair. 08
- b) Explain in detail the mechanisms of recombination with Holiday model. 08

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M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
BIOTECHNOLOGY

Industrial and Environmental Biotechnology (MSC33301)

Day & Date: Friday, 05-01-2024

Max. Marks: 80

Time: 11:00 AM To 02:00 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 indicates full marks.

Q.1 A) Choose correct alternative.

10

- 1) A completely mixed continuous stirred-tank reactor for the cultivation of cells is called?
 - a) Electrostatic
 - b) Chemostat
 - c) Haemostat
 - d) Thermostat
- 2) Which of the following type of fermentation is observed in yeasts
 - a) Acrylic fermentation
 - b) Alcohol fermentation
 - c) Lactic Acid fermentation
 - d) Citric acid fermentation
- 3) Which among the following is not a vegetable or fruit-based fermented product?
 - a) Vinegar
 - b) Wine
 - c) Sauerkraut
 - d) All of the above
- 4) Which among the following is referred to as an upstream process?
 - a) Media Formulation
 - b) Cell lysis
 - c) Product Recovery
 - d) Product purification
- 5) Which of the following is a downstream process?
 - a) Screening
 - b) Product recovery
 - c) Media formulation
 - d) Sterilization of media
- 6) What do you mean by the term "Trace elements"?
 - a) Very small amount
 - b) Medium amount
 - c) High amount
 - d) Very high amount
- 7) Complex carbohydrates which make up cell wall in plants are?
 - a) Lactose
 - b) Fructose
 - c) Cellulose
 - d) Sucrose
- 8) Which type of chromatography depends on the principle of size of particles?
 - a) Affinity chromatography
 - b) Gel- filtration chromatography
 - c) Ion- exchange chromatography
 - d) Multimodal chromatography
- 9) Which of the following is not included in immobilization process?
 - a) Absorption
 - b) Adsorption
 - c) Entrapment
 - d) Affinity

- 10) Which type of fermentation is used for large scale manufacturing of enzymes?
- | | |
|---------------------------------|---------------------------|
| a) Solid-state fermentation | b) Submerged fermentation |
| c) Solid-Gas state fermentation | d) Gas-state fermentation |

B) Fill in the blanks OR Write true/ False 06

- 1) Bio-fuels are products of fermentation.

a) True	b) False
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- 2) An alternative of chemostat is turbidostat?

a) True	b) False
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- 3) The productivity of the continuous culture must be greater than the batch

a) True	b) False
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- 4) In penicillin production process, batch fermentation is used.

a) True	b) False
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- 5) Mechanical foam breaker is generally preferred over antifoam agents.

a) True	b) False
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- 6) Airlift reactors generally do not provide better mixing than bubble columns.

a) True	b) False
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Q.2 Answer the following 16

- a) Add a short note on Energy Sources
- b) With suitable example explain SCP
- c) Add a note on upstream process of ethanol.
- d) What are Bioindicators?

Q.3 Answer the following. 08

- a) What is downstream processing? 08
- b) What is Air Pollution? Mention different controlling measure of air pollution? 08

Q.4 Answer the following. 10

- a) What is Bioreactor? Discuss in detail the types of Bioreactors? 10
- b) In brief discuss about fermentation media preparation and sterilization? 06

Q.5 Answer the following. 08

- a) Discuss the concept of clean environment. What are Bio- fertilizers discuss with suitable example? 08
- b) What is Environmental Impact Assessment? State different Environment protection laws? 08

Q.6 Answer the following. 10

- a) What are organic acid? In detail discusses the upstream process of citric acid with its application? 10
- b) Discuss the manufacturing (fermentation) process of Penicillin? 06

Q.7 Answer the following. 08

- a) Define an Effluent? In detail discuss the effluent treatment process used in solid waste management. 08
- b) Discuss the type of fermentation process and kinetics with respect to Batch and Continuous process. 08

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

Day & Date: Sunday, 07-01-2024
 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) Figures to the right indicate full marks.

Q.1 A) Choose correct alternative.

10

- 1) The most efficient method of gene transfer is _____.
 a) Biolistic gun b) Electroporation
 c) Lipofection d) Microinjection
- 2) Enzyme used in *in-vitro* gene cloning is _____.
 a) Polymerase b) Ligase
 c) Galactosidase d) EcoR 1
- 3) Pest resistant plants are produced by using transgene from _____.
 a) virus b) fungi
 c) animal d) bacteria
- 4) _____ is an example for viral cloning vector.
 a) M13 b) pUC18
 c) BAC d) YAC
- 5) The plant with transgene for beta carotene production is _____.
 a) wheat b) maize
 c) pea d) rice
- 6) _____ of the following technique is based on PCR.
 a) RAPD b) HPLC
 c) RELP d) GLC
- 7) _____ of the following is used for the analysis of DNA.
 a) Southern blotting b) Northern blotting
 c) Western blotting d) CHEF
- 8) Molecular markers are used to detect _____ in the population.
 a) Similarity b) variation
 c) evolutionary distance d) phenotype
- 9) Probes binding to specific DNA are detected by _____.
 a) X-ray crystallography b) NMR
 c) Chromatography d) Autoradiography
- 10) cDNA is prepared from _____ of the following.
 a) ssDNA b) mRNA
 c) rRNA d) tRNA

- B) Fill in the blanks.** **06**
- 1) Hind III belongs to _____ class of restriction enzymes.
 - 2) In pUC 18, the UC stands for _____.
 - 3) The technique of PCR was invented by _____.
 - 4) Ti plasmid is naturally found in _____ bacteria.
 - 5) The di-dNTPs are used in _____ method of DNA sequencing.
 - 6) The gene therapy in adult cells is called as _____.
- Q.2 Answer the following.** **16**
- a) Add a note on DNA manipulating enzymes.
 - b) Write a note on plasmid cloning vector with diagram.
 - c) Write a brief account probe labelling methods.
 - d) Write a note on transgenic animals 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 construction and screening of cDNA library.
 - b) Add an account on RFLP technique with applications.
- Q.5 Answer the following.** **16**
- a) Add a note on DNA and protein microarray technique.
 - b) Write a note on physical methods of gene transfer.
- Q.6 Answer the following.** **16**
- a) Write a note on genetic engineering in plants with examples.
 - b) Explain molecular diagnosis and detection of infectious diseases.
- Q.7 Answer the following.** **16**
- a) Define VNTR. Explain the technique of DNA fingerprinting.
 - b) Write a note on types of PCR with applications.

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

Day & Date: Tuesday, 09-01-2024
 Time: 11:00 AM To 02:00 PM

Max. Marks: 80

- Instructions:** 1) Question 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 correct alternative. (MCQ) 10

- 1) _____ functions as an Auxin Receptor in the mechanism of Auxin action.
 - a) ABS1
 - b) ABP1
 - c) CR1
 - d) GA1
- 2) Select a macroelement from the following required for plant nutrition.
 - a) Phosphorus
 - b) Zinc
 - c) Manganese
 - d) Iron
- 3) _____ technique involves cultivating individual cells on top of an actively growing callus separated by a piece of filter paper.
 - a) Bergmann's technique of cell plating.
 - b) Microdrop method.
 - c) The microchamber technique.
 - d) The filter paper raft-nurse technique.
- 4) The process of embryo development is called _____.
 - a) endomitosis
 - b) organogenesis
 - c) organ culture
 - d) embryogenesis
- 5) Acclimatization of micropropagated plants on a large scale is generally carried out in _____.
 - a) refrigerator
 - b) polyhouse
 - c) soil
 - d) water
- 6) An enucleated protoplast is also called as _____.
 - a) Hybrid
 - b) Cybrid
 - c) Cytoplast
 - d) Tropoplast
- 7) _____ have been used as the explant to produce gynogenic haploids.
 - a) Pollen
 - b) Anther
 - c) Meristem
 - d) Ovule
- 8) The genes responsible for T-DNA transfer are located in a separate part of the Ti plasmid called the _____.
 - a) Conjugation principle
 - b) border sequences
 - c) vir region
 - d) Transformation principle
- 9) Bt cotton is a genetically modified pest resistant cotton variety, which produces an insecticide to combat _____.
 - a) bollworm
 - b) silkworm
 - c) drouht
 - d) blight

10 _____ technology is used for Production of Recombinant Proteins in Oil Seeds.

- a) Particle bombardment
- b) Electroporation
- c) Microinjection
- d) Oleosin Partitioning

B) Write True or False. 06

- 1) Crown gall disease is caused by *Agrobacterium tumefaciens*.
- 2) Tissue culture room can be fumigated overnight and sterilized with water.
- 3) A protoplast is a cell without cell wall.
- 4) Introduction of foreign genes into plant cells using micropipettes is electroporation.
- 5) Unorganized proliferative mass of plant cells in tissue culture is called tumor.
- 6) Variations observed during tissue culture are somaclonal variations.

Q.2 Write short answers of the following 16

- a) Tissue culture Media.
- b) Organogenesis
- c) Electroporation
- d) Commercial micro propagation.

Q.3 Answer the following.

- a) Give a detailed account on Lab setup of Plant Tissue Culture laboratory. 10
- b) Explain Particle bombardment for gene transfer in plants. 06

Q.4 Answer the following.

- a) Discuss Initiation and Maintenance of callus. 08
- b) Explain purification strategies by oleosin partitioning technology. 08

Q.5 Answer the following.

- a) Write the principle of Somatic Embryogenesis and describe Synthetic seeds production. 10
- b) Discuss Basics of Tumor formation in plants. 06

Q.6 Answer the following.

- a) Write about Mechanism of T-DNA transfer: role of Virulence gene. 08
- b) Discuss Applications of plant biotechnology for Biotic stress resistant plants. 08

Q.7 Answer the following.

- a) Write the principle of Protoplast Isolation and Culture. 08
- b) Write about production of Haploid Plants and Homozygous lines. 08

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M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
BIOTECHNOLOGY

Animal Biotechnology and Stem Cell Technology (MSC33401)

Day & Date: Monday, 18-12-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

- 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 correct alternative.

10

- 1) First cloned animal was _____.
a) Dolly sheep b) Dog
c) Mule d) Cat
- 2) Adult stem cells are derived from _____.
a) Egg b) Embryo
c) Fetus d) Mature organs
- 3) The classic source of hematopoietic stem cells is _____.
a) Bone marrow b) Liver
c) Pancreas d) Kidney
- 4) Medullary plate of a chick embryo was maintained by Roux in _____.
a) Agar clot b) Serum
c) Plasma clots d) Warm saline
- 5) A transplant of organs from one species to another is _____.
a) Isograft b) Split transplant
c) Xenograft d) Domino transplant
- 6) Animal cell cultures are used widely for the production of _____.
a) Insulin b) Somatostatin
c) MABS d) Thyroxine
- 7) Interferons are _____.
a) Antibacterial proteins b) Anti viral proteins
c) Bacteriostatic proteins d) All of these
- 8) The first human cell line to be grown continuously in the laboratory is _____.
a) HeLa cell line b) MRC-5
c) 3T3 cell line d) HLM cell line
- 9) The optimum pH for cell line to grow is _____.
a) 3 b) 6
c) 7.4 d) 5.7

- 10) ES cell line in culture was first obtained by _____.
a) IVF
b) Mouse blastocyst
c) Chick embryo
d) Germ cells

B) Write True or False. 06

- 1) Rapid chilling results in thermal shock and leads to cell death.
- 2) Hemocytometer is used for cell counting.
- 3) Serum increases the cost of medium.
- 4) Alexis carrel applied aseptic techniques to tissue culture.
- 5) Regeneration is the process of giving specialized cells from unspecialized cells.
- 6) Enzymes used in tissue disaggregation are trypsin and collagenase.

Q.2 Answer the following. 16

- a) Write note on Fetal stem cells.
- b) Write significance of knock out animals in biotechnology.
- c) Write note on Cryopreservation.
- d) Define:
 - i) Animal Biotechnology
 - ii) Suspension culture

Q.3 Answer the following.

- a) Write in details about immunoisolation techniques. 08
- b) Explain in brief the Hybridoma Technology. 08

Q.4 Answer the following.

- a) Write in details the types of stem cells in liver. 08
- b) Explain in brief the bioreactor design. 08

Q.5 Answer the following.

- a) Explain in brief the Hybridoma technology. 08
- b) Explain Bioartificial pancreas. 08

Q.6 Answer the following.

- a) Explain in brief the Bioprinting of organs. 08
- b) Explain different modes of cell and tissue delivery in stem cell technology. 08

Q.7 Answer the following.

- a) Explain in brief isolation methods of stem cells from adult organs. 08
- b) Explain in brief transgenic animal technology with the help of example. 08

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M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
Biotechnology
Advanced Analytical Techniques (MSC33402)

Day & Date: Tuesday, 19-12-2023
 Time: 03:00 PM 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 emission phenomena.
 - a) SEM
 - b) TEM
 - c) Fluorescence
 - d) Raman
- 2) The mulling agent for sample preparation is used in _____ spectroscopy.
 - a) UV
 - b) IR
 - c) NMR
 - d) CD
- 3) The wavelength of Visible light is _____.
 - a) 400-780nm
 - b) 2-180nm
 - c) 200-400nm
 - d) 200nm-780nm
- 4) The ratio of mass to charge is used in _____ technique
 - a) Microscopy
 - b) Mass Spectroscopy
 - c) Laser
 - d) Crystallography
- 5) The solidifying agent used in PAGE is _____.
 - a) Tris
 - b) TEMED
 - c) HCL
 - d) EDTA
- 6) Probes binding to specific DNA are detected by _____.
 - a) X-ray crystallography
 - b) NMR
 - c) Chromatography
 - d) Autoradiography
- 7) In gas chromatography the mobile phase is usually _____.
 - a) Solid
 - b) Liquid
 - c) Gas
 - d) Plasma
- 8) Radio waves are used as source in _____ spectroscopy.
 - a) UV
 - b) Visible
 - c) IR
 - d) NMR
- 9) The type of electrophoresis used in DNA sequencing is _____.
 - a) Agarose
 - b) Polyacryl amide
 - c) Paper
 - d) Capillary
- 10) Refractive index parameter is associated with _____ technique.
 - a) CD
 - b) ORD
 - c) Microscopy
 - d) NMR

- B) Fill in the blanks.** **06**
- 1) TOF stands for _____.
 - 2) In colorimetry the nature of sample is usually _____.
 - 3) _____ invented the compound microscope.
 - 4) The force used in centrifugation technique is _____.
 - 5) _____ are labelled in blotting techniques.
 - 6) GCMS stands for _____.
- Q.2 Answer the following** **16**
- a) Add a note on principle of compound microscopy.
 - b) Write a note on applications of chromatography.
 - c) Write a brief account on horizontal gel electrophoresis.
 - d) Write a note on Circular Dichroism spectroscopy.
- Q.3 Answer the following.** **16**
- a) Write a note on Confocal Microscopy.
 - b) Write the principle and applications of Affinity chromatography.
- Q.4 Answer the following.** **16**
- a) Explain the principle and components of Native-PAGE.
 - b) Add an account on Western blotting technique with applications.
- Q.5 Answer the following.** **16**
- a) Define electromagnetic spectrum. Add a note on properties of electromagnetic waves.
 - b) Explain the principle and instrumentation of IR spectroscopy.
- Q.6 Answer the following.** **16**
- a) Explain the principle and applications of Atomic absorption spectroscopy.
 - b) Write a note on Isoelectric focusing with applications.
- Q.7 Answer the following.** **16**
- a) Explain methods of radioactivity detection and measurement.
 - b) Add a note on types and applications of centrifugation technique.

- 9) _____ of the following is the first step in starting the research process.
- a) Identification of problem
 - b) Searching sources of information to locate problem
 - c) Searching for solutions to the problem
 - d) Survey of related literature
- 10) Applied research is directed towards _____.
- a) Problem solving
 - b) Real time problems
 - c) Action oriented research
 - d) Fundamental research

B) Write true/false 06

- 1) Plant breeder's right programme was established in 1997 (True/False).
- 2) Claims are the important part of complete Specification in patent filing (True/False).
- 3) During patent examination Indian Patent system has Pre-grant opposition and Post-grant opposition (True/False).
- 4) If you file provisional specification, the complete specification is required to be filed within 18th months (True/False).
- 5) Patent Act, 1970 is an intellectual property law (True/False).
- 6) Excel is a best tool used for presenting the data to a group (True/False).

Q.2 Answer the following 16

- a) Explain the correlation Coefficient.
- b) What is UPOV? Describe the missions and goals of UPOV.
- c) Explain the detail the guidelines for writing abstract.
- d) Write a note on Review of Literature.

Q.3 Answer the following 08

- a) What is test of significance? Describe the test of significance of Mean, Proportion, and Variance. 08
- b) What is sampling theory? Explain types of Sampling with its advantages and limitations. 08

Q.4 Answer the following 08

- a) Describe in detail the types of patents. 08
- b) Write in detail the goals and objectives of World Intellectual Property Organization. 08

Q.5 Answer the following 08

- a) Explain in detail the author instructions of Indian journal of Biotechnology. 08
- b) Discuss in detail the guidelines for preparation of poster for conferences. 08

Q.6 Answer the following 08

- a) What is Farmer's right? Describe the advantages and disadvantages of PBR. 08
- b) Explain in detail the process of technology transfer. 08

Q.7 Answer the following 08

- a) What is Research? Explain the steps in Research. 08
- b) Explain in detail the objectives of research and add a note on significance of Research. 08

Seat No.	
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**M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
BIOTECHNOLOGY**

Medical Biotechnology and Bionanotechnology (MSC33406)

Day & Date: Thursday, 21-12-2023
Time: 03:00 PM To 06:00 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) Multiple choice questions.

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- 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) The coagulase test is used to differentiate _____.
 a) *Staphylococcus epidermidis* from *Neisseria meningitidis*
 b) *Staphylococcus aureus* from *Staphylococcus epidermidis*
 c) *Streptococcus pyogenes* from *Staphylococcus aureus*
 d) *Streptococcus pyogenes* from *Enterococcus faecalis*
- 4) Attachment of erythrocytes to surface of virally infected cell is termed as _____.
 a) Interference b) Hemadsorption
 c) Neutralization d) Complement fixation
- 5) 10 nm = _____ m.
 a) 10^{-8} b) 10^{-7}
 c) 10^{-9} d) 10^{-10}
- 6) Duration during which a specific antibody develops and becomes detachable in the blood is known as _____.
 a) Serology b) Blood culture
 c) Seroconversion d) Antibody production
- 7) _____ is the possible pathogen that can invade the skin and cause tissue damage in humans.
 a) *E.coli* b) *Bacillus cereus*
 c) *Clostridium perfringens* d) *Proteus mirabilis*
- 8) _____ are toxin bacteria which are predominantly present as normal flora in urine.
 a) *Escherichia coli* b) *Staphylococcus epidermidis*
 c) *Staphylococcus aureus* d) *Streptococcus pyogenes*
- 9) The melting point of particles in nano form _____.
 a) Increases b) Decreases
 c) Remains same d) Increases then decreases

