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Total No. of Questions : 11

ENVIRONMENT BIOTECHNOLOGY

M.Code : 756664

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains EIGHT questions carrying FIVE marks each and students have to attempt any SIX questions.
3. SECTION-C contains TWO questions with internal choice carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Describe briefly :
 - a) What is PAH?
 - b) Define Coagulation.
 - c) Explain rotating biological contractors.
 - d) Name Waterborne infectious agents.
 - e) Define Vermiculture.
 - f) Define trickling filters.
 - g) Define microbial leaching.
 - h) Define Aerated lagoons.
 - i) Define Biomnneralization.
 - j) What do you mean by Phytoremediation?

SECTION-B

2. Explain the metagenomics and culture-based approaches for bioremediation.
3. Highlight and explain parameters of evaluation monitoring.
4. Discuss the Preliminary treatment and microbial leaching.
5. Differentiate between microbial leaching and phytoextraction.
6. Analyze the Wastewater treatment efficiency assessment.
7. Explain PAH and biomedical solid wastes and their treatment.
8. Elaboration on Biodegradation of lignocelluloses.
9. Explain distillery and pharmaceutical industries?

SECTION-C

10. Discuss the Metagenomics and culture-based approaches and Municipal techniques for prevention and biomedical solid wastes and their treatment and innovative techniques for prevention and control of pollution.

OR

11. Explain detection and control of pathogenic microbes in water wastewater methods

OR

- Explore the biomineralization, biofuel, biodegradation of lignocelluloses and bio composting?

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June-2024

Total No. of Questions : 11

Total No. of Pages : 02

Master of Science (Bio Technology) (Sem.-1)
COMPUTER APPLICATIONS

Subject Code : MBT/105

M.Code : 75663

Date of Examination : 15-06-2024

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- Define system software.
- What does binary representation use to encode data?
- How do you declare an array of integers in C++?
- What is a primary key in a database?
- How do you define a string in C++?
- Define function overloading.
- What does the keyword 'this' represent in a class method?
- What operator is used to increment a variable in C++?
- Define a cell in the context of a spreadsheet.
- What function would you use to sum a range of cells in a spreadsheet?

SECTION-B

2. Explain the difference between system software and application software. Provide an example of each.
3. Discuss the importance of an operating system in managing computer hardware and software resources. Give some examples of operating systems. What are its different operations?
4. Discuss the difference between function overloading and operator overloading in C++. Provide examples to illustrate how each is implemented?
5. Discuss the various types of operators in C++ (arithmetic, relational, logical, and bitwise). Provide examples of how each type is used in a program?
6. How can you concatenate two strings, find the length of a string, and compare two strings? Provide code examples to illustrate these operations.
7. Describe how arrays are used in C++ to store and manipulate data. Include an example of how to iterate through an array using a loop?
8. Explain how mail merge works in a word processor? Describe a scenario where mail merge would be particularly useful, and outline the steps involved in setting it up.

SECTION-C

9. Discuss in detail the concepts of inheritance, containership, and polymorphism in C++ with a focus on their differences and relationships. Provide examples demonstrating single and multiple inheritance, the use of base and derived classes, and how containership allows for building complex objects?
10. Write a detailed explanation of control structures in C++, including sequence, selection, and iteration. Describe how each type of control structure affects the flow of a program? Provide code examples for each type, illustrating how they are used to solve common programming problems?
11. Discuss the importance of arrays and strings in C++ programming. Explain how arrays can be used to handle collections of data and how strings are managed as arrays of characters?

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Total No. of Pages : 02

Total No. of Questions : 11

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M.Sc. (BT) (Sem.-1)

APPLIED MICROBIOLOGY

Subject Code : MBT/102

M.Code : 75660

Date of Examination : 13-06-2024

Time : 3 Hrs.

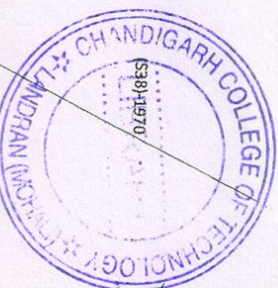
Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Describe briefly:
 - a. Bioenergetics
 - b. Basal media and Selective media
 - c. Unicellular eukaryotes
 - d. Nonsense and Missense mutation
 - e. Metabolic genes
 - f. Synchronous growth
 - g. Quorum sensing
 - h. Steam sterilization
 - i. Name two microorganisms used for production of antibiotics
 - j. Name two plant and animal viruses.



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SECTION-B

2. Write a brief note on morphological features of eubacteria.
3. Describe batch, fed batch and continuous fermentation kinetics.
4. Describe the salient features of viruses.
5. Describe the effect of pH and temperature on fermentation process.
6. Discuss about the key components required for the preparation of growth media.
7. Describe primary and secondary metabolites with examples.
8. What do you mean by food infections and intoxication? Enlist some microorganisms responsible for causing infections in humans.

SECTION-C

9. What is microbial growth kinetics? Describe the different phases of microbial growth with the help of growth curve diagram.
10. What are pathogenicity islands? Explain their role in bacterial virulence with examples.
11. Describe the following :
 - a. Methods for strain development
 - b. Methods for preservation of food.

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Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. (BT) (Sem.-1)

GENETICS AND MOLECULAR BIOLOGY

Subject Code : MBT/103

M.Code : 75661

Date of Examination : 09-06-2024

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

- a) Allele and its examples
- b) Complementation tests
- c) Differentiate between germinal and somatic mutations.
- d) Causes of mutations
- e) Define penetrance and expressivity
- f) Importance of genetic diversity
- g) Difference between phenocopy and genetic trait
- h) Concept of genetic imprinting
- i) Importance of telomere replication
- j) Draw a well labelled diagram of tRNA.

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SECTION-B

2. Discuss RNA processing in eukaryotic cells.
3. Explain the concept of polygenic inheritance and how it differs from Mendelian genetics.
4. Discuss fine structure analysis genes and its role in gene mapping.
5. Describe RNA processing, including splicing of mRNA and the role of the spliceosome.
6. Describe different types of mutations. Discuss their causes and mechanisms of occurrence.
7. Discuss the genetic code and the process of translation in prokaryotes.
8. Describe tetrad analysis and its application in mapping genes.

SECTION-C

9. Describe the process of DNA replication in prokaryotes.
10. Discuss the regulation of transcription and the role of transcription factors in controlling gene expression.
11. Write short notes on the following :
 - a) RNA polymers-structure and function
 - b) Post-translational Modifications.

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Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. (BT) (Sem.-1)
NANOBIOTECHNOLOGY

Subject Code : MBT-112

M.Code : 75665

Date of Examination : 08-06-2024

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is **COMPULSORY** consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Explain Briefly :**

- How do surface properties influence the behavior of nanoparticles?
- What are the potential applications of nanobiotechnology?
- What are DNA-based nanostructures?
- How surface modifications affect the functionality of nanoparticles?
- How nanoparticles differ from bulk materials?
- What are Nanofertilizers?
- What properties make quantum dots valued in nanotechnology?
- What are the challenges in development of nanobiotechnology?
- How does the size of nanomaterials influence their properties?
- What are magnetosomes?

SECTION-B

2. What role do nanomaterials play in enhancing biomolecular sensing?
3. How does the immune system interact with nanomaterials in biological processes?
4. How do nanobiotechnological approaches help to improve crop yield?
5. How does nanobiotechnology contribute to food safety?
6. How do nanoparticles and quantum dots contribute to advancements in nanobiotechnology?
7. How nanomaterials are integrated into nanobioelectronic devices?
8. What are the potential applications of hybrid conjugates of gold nanoparticles in nanobiotechnology?

SECTION-C

9. What are historical events that paved the way for integration of biology, chemistry, and materials science?
10. What are the advantages of using proteins as building blocks for nanostructures?
11. Explain the key techniques used in nucleic acid engineering and its common applications in nanobiotechnology?

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Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. (Biotechnology) (Sem.-2)

CELL AND DEVELOPMENTAL BIOLOGY

Subject Code : MBT/201

M.Code : 76245

Date of Examination : 08-05-2024

Max. Marks : 70

Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

INSTRUCTIONS TO CANDIDATES :
SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks

each. SEVEN questions carrying SIX marks each and students

SECTION-B contains SEVEN questions. You have to attempt any FIVE questions.

SECTION C contains THREE questions.
Answer any TWO questions.

SECTION-A

1. Write briefly:

- a) Give organization and role of Golgi apparatus.
- b) Explain functions of lysosomes.
- c) What is cytoskeleton? Give examples.
- d) What do you understand by cell lineage?
- e) Define cell senescence.
- f) What is gametogenesis?
- g) What is zygote?
- h) Briefly explain the importance of regeneration in vertebrates.
- i) Explain the term phylotaxy.
- j) Write a brief note on organogenesis.

SECTION-B

3. Explain the structure of a typical eukaryotic cell using well labeled diagram. List its functions of important cell organelles also.
4. Describe the organization of eukaryotic chromatin and metaphase chromosomes.
5. What are malignant cells? Explain their properties.
6. Explain various mechanisms and applications of signal transduction cascades.
7. Define the term developmental biology? Explain the process of gastrulation and formation of three germ layers in the case of animals.
8. Explain the process of seed formation in plants. What is the importance of abiotic factors in seed germination?
9. Explain the mechanism of eye lens induction in animals.

SECTION-C

9. Draw a well-illustrated diagram of plasma membrane. Explain various mechanisms of transport through biological membranes.
10. What are morphogenetic gradients? How do they determine cellular differentiation in animals?
11. Explain the process of vulva formation in *Caenorhabditis elegans*.

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Total No. of Pages : 02

Total No. of Questions : 11

M.Sc.(BT) (Sem.-2)

IMMUNOLOGY AND IMMUNOTECHNOLOGY

Subject Code : MBT/202

M.Code : 76246

Date of Examination : 11-05-2024

Max. Marks : 70

Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Describe the following:
 - a. Blast formation
 - b. Lymphoid tissues
 - c. Hybridoma cell
 - d. Tumor antigens
 - e. Graves' disease
 - f. Immunocytochemistry
 - g. Isotype switching
 - h. Structure of IgM
 - i. Role of epitope
 - j. Characteristics of cytokines

SECTION-B

2. Discuss briefly-rearrangement of immunoglobulin genes.
3. What are different types of MHC? Explain with structure.
4. Give significance of CD4 and CD8 Tcells.
5. What is tumor evasion of immune system? Give mechanism also.
6. Write a short note on Immunohistochemistry.
7. Write down about principle and applications of Radioimmunoassay.
8. Explain different types of ELISA in detail.

SECTION-C

9. Discuss in detail different cells and tissues of the immune system.
10. Give an account of immunological basis of graft rejection. Also, add a note on immunosuppressive therapy.
11. What are cytokine related diseases? Explain systemic auto immune diseases.

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Total No. of Pages : 02

M.Sc. (BT) (Sem.-2)

ENZYME TECHNOLOGY

Subject Code : MBT-203

Date of Examination : 15-05-2024

Max. Marks : 70

Time : 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

- INSTRUCTIONS TO CANDIDATES :**
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each. to
 2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Describe the following :
 - a. Plasma enzyme
 - b. Oxidoreductase enzyme
 - c. Holoenzyme
 - d. Irreversible inhibition
 - e. Enzyme assay
 - f. Lineweaver-Burk plot
 - g. Lactate dehydrogenase
 - h. Substrate inhibition
 - i. Identification of binding and catalytic sites
 - j. Sub-cellular compartmentalization.

SECTION-B

2. What are enzymes? Discuss briefly about the classification of enzymes with suitable examples.
3. How would you purify an enzyme? Give detail.
4. What are the different factors affecting rate of reaction?
5. Explain kinetics of multisubstrate reactions catalysed by enzyme.
6. Write a note on binding of ligands to protein.
7. What is inborn error of metabolism? Explain.
8. Give an account of allosteric enzyme along with its role.

SECTION-C

9. Give production and applications of immobilization enzymes.
10. Discuss in detail reversible and irreversible inhibition of enzyme.
11. Write short notes on monomeric enzymes and mechanism of enzyme catalysts.

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Total No. of Pages : 02

Total No. of Questions : 11

**M.Sc. Biotechnology (Sem.-2)
BIOPROCESS ENGINEERING**

Subject Code : MBT/205

M.Code : 76249

Date of Examination : 18-05-2024

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Describe briefly :
 - a. Batch, fed batch and continuous fermentation
 - b. Dilution rate and specific growth rate
 - c. Hydrodynamic fermenters and their applications
 - d. Bioconversion *versus* chemical transformation
 - e. D value in Sterilization process
 - f. Liquid-liquid extraction
 - g. Relationship of τ_{pm} and τ_c in centrifugation
 - h. Role of microbes in pickling process.
 - i. Composition of Molasses and its use in Fermentation process
 - j. K_{La} in Fermentation Process.

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SECTION-B

2. Describe the different phases of microbial growth curve.
3. Explain various methods used for long term preservation of microbial cultures.
4. What do you mean by up-streaming and down-streaming in bioprocesses?
5. How agitation and aeration affect any bioprocess in fermenter?
6. What are biocolours and bioflavours? Give two examples of each.
7. Describe various methods used for microbial cell disruption in brief.
8. What are fermented foods? Draw a flow chart for the production process of any one fermented food.

SECTION-C

9. What is microbial strain improvement? Describe various strategies used for strain improvement of Industrial microorganisms.
10. Define submerged, surface and solid state fermentations. Discuss various factors affecting the solid state fermentations.
11. Explain their principle of anion and cation exchange chromatography. How these techniques are used for purification of fermentation products



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Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. Biotechnology (Sem.-2)

PLANT TISSUE CULTURE

Subject Code : MBT/211

M.Code : 76250

Date of Examination : 22-05-2024

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Attempt the following :

- a) Define cryopreservation.
- b) What are totipotent cells?
- c) Which agents are used for surface sterilization of plant parts?
- d) What is an explant?
- e) What is the role of gibberellins in plant growth?
- f) What are biotransformation reactions?
- g) Which was the first transgenic plant to be produced?
- h) What is a callus culture?
- i) Which basal medium is used for establishing plant tissue culture?
- j) What is the role of agar in tissue culture media?

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SECTION-B

2. Write the steps involved in establishing a plant tissue culture.
3. Describe the development of disease-free plants.
4. What are somaclonal variations? Discuss.
5. Describe biotransformation using plant tissue culture.
6. Write a note on the mode of action of auxins.
7. Briefly discuss the importance and major applications of mother culture.
8. Write a note on genetic transformation in plants.

SECTION-C

9. What are the major components of plant tissue culture media? Discuss.
10. Write a note on in vitro production of secondary metabolites.
11. What are plant growth regulators? Describe their physiological effect.

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June-2024

Roll No.

Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. Biotechnology (Sem.-2)
MOLECULAR CARCINOGENESIS & THERAPY

Subject Code : MBT/213

M.Code : 76252

Date of Examination : 25-05-2024

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- i) Protooncogenes
- ii) Carcinogenesis
- iii) Retrotransposons
- iv) Go in Cell cycle
- v) Hodgkins disease
- vi) Normal and abnormal cells
- vii) Genomic Instability
- viii) Progenitor cells
- ix) Tumour markers
- x) Gene Silencing.

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SECTION-B

2. Write a note on Origin of Cell Lines.
3. What is the role of Growth Factor- Receptor Interaction in the process of Carcinogenesis?
4. Write a note on RNA and DNA tumour Viruses.
5. Discuss about chromosomal abnormalities in Human Tumours.
6. How do Oncogenes carrying Retroviruses influence carcinogenic events?
7. Discuss characteristic feature of cancer cells.
8. List and explain briefly primary screening methods for anticancer agents.

SECTION-C

9. Discuss Carcinogenesis with reference to Cell cycle, Growth Factor requirements and mutations in Dividing cells.
10. Delineate role of cancer gene therapy and vaccines in Cancer treatment.
11. Give a detailed account of characteristic features of Cancer cells at Molecular, Genetic and cellular level.

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June-2024

Total No. of Pages : 02

M.Sc. (BT) (Sem.-3)

FOOD BIOTECHNOLOGY

Subject Code : MBT 312

M.Code : 76734

Date of Examination : 24-06-2024

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**
 - a) Give the use of Mallic and fumaric acid in food.
 - b) Cite a few examples of biosensors.
 - c) Who termed "nutraceutical"?
 - d) What is the significance of protein engineering?
 - e) Name a few markers in the development of functional foods.
 - f) Can obesity be controlled by diet regulation? How?
 - g) Write the limitation of using flavors in food.
 - h) What are the prospects of nutrigenomics in India?
 - i) Give a few examples of functional foods.
 - j) How does food technology help in the development of functional foods?

SECTION-B

2. Briefly describe the significance of Nisin in the food industry.
3. Write the applications of biosensors in food processing.
4. Briefly discuss the role of functional foods in preventing diseases in humans.
5. Briefly discuss the food flavors and their application in the food industry.
6. What is nutrigenomics? Give its significance.
7. What are biogums? Discuss its significance.
8. Discuss the oilseed crops and their application in food.

SECTION-C

9. What are Nutraceuticals? How are they classified? How are they different from pharmaceuticals?
 10. How does nutrigenomics help in unraveling the physiological effects of complex foods?
11. Briefly discuss any two :
- a) Nisin
 - b) Glucose isomerases
 - c) Bio colors
 - d) Transporter gene polymorphism.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 11

M.Sc (Biotechnology) (Sem.-3)

BIOSTATISTICS

Subject Code : MBT302

M.Code : 76729

Date of Examination : 14-06-2024

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write a short note on :

- a) Significance of ANOVA. How is it implemented?
- b) Importance of standard deviation.
- c) Applications of sampling techniques.
- d) Difference between diagram and graph.
- e) Merits and demerits of mode.
- f) Uses of chi-square test.
- g) Test for proportion.
- h) Properties of binomial distribution.
- i) Importance of measure of precision.
- j) Types of regression.

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SECTION-B

2. Define normal distribution and various properties of normal distribution and normal probability curve.
3. Define relative measure of dispersion. Explain various requisites of a good measure of dispersion.
4. What is poisson distribution? Explain its characteristics and under which conditions it is used.
5. Define t-test and its types. Discuss the various properties and applications of 't' distribution.
6. Explain the various types of correlation with examples.
7. Write a detailed note on various types of non-parametric tests.
8. Explain design of experiment and its various principles.

SECTION-C

9. a) Write about pie charts and scatter plots.
b) Discuss the various methods of presentation of statistical data in detail.
10. Write a detail note on computer applications in bio-statistics.
11. Enumerate the conditions in which :
a) Parametric and non-parametric tests
b) Paired and unpaired t test should be selected.

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Total No. of Pages : 02

Total No. of Questions : 11

**M.Sc. (Biotechnology) (Sem.-3)
GENOMICS AND PROTEOMICS**

Subject Code : MBT303

M.Code : 76730

Date of Examination : 18-06-2024

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- (a) What are sequences and sequencing?
- (b) Expand EST and SAGE?
- (c) 2D-IEF.
- (d) Genomics and transcriptomics.
- (e) Mass finger-printing.
- (f) Methods of peptide separation.
- (g) Protein expression profiles.
- (h) Genome mapping.
- (i) DNA-Protein interactions.
- (j) Protein modifications.

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SECTION-B

2. How does the organization of genetic material, cytoskeleton and ribosome differ between prokaryotic and eukaryotic cells?
3. How do genetic mutations contribute to genome evolution?
4. What are ESTs? How one can generate them?
5. What are the advantages and limitations of using chemical methods for protein digestion compared to enzymatic digestion?
6. What are protein-protein interactions, and why are they crucial for cellular processes?
7. Explain SAGE and TILLING.
8. How does mass spectrometry enable the identification and quantification of molecules in complex samples?

SECTION-C

9. What are SNPs? Give their importance and methods of their determination in detail?
10. What do you mean by microarray? Give its types along with principle, methods and applications.
11. What is the genome sequencing? Explain its methods along with strategies and applications.



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June-2024

Roll No.

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Total No. of Pages : 02

Total No. of Questions : 11

M.Sc (Biotechnology) (Sem-3)
IPR, GOOD LAB PRACTICES AND BIOETHICS

Subject Code : MBT304

M.Code : 76731

Date of Examination : 20-06-2024

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a. Define Patent
- b. IDA
- c. WIPO
- d. Industrial Designs
- e. Copyrights
- f. Radiation safety
- g. Biocontainment
- h. Patent Infringement
- i. Bioethics
- j. Ethical dilemma.

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SECTION-B

2. What do you mean by IP and IPRs? Enlist various forms of IPRs.
3. Enlist salient features of TRIPs agreement.
4. Explain objectives of TKDL.
5. Explain different biosafety levels for a biotech research laboratory.
6. Discuss about the Farmers Rights in India related to registered plant varieties.
7. Discuss some ethical issues related with patenting in biotechnology.
8. Explain the concept of biopiracy with examples.

SECTION-C

9. Define invention. Discuss the basic requirements of patentability of biological inventions in India.
10. Write a detailed note on the concept of GLPs. Also, discuss its importance.
11. Write a detailed note on Haldi patent case.

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June-2024



Roll No.

Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. (BT) (Sem.-1)
NANOBIOTECHNOLOGY
Subject Code : MBT-112
M.Code : 75665
Date of Examination : 20-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write short note on following :

- a) Write a short note on flexibility of biomaterials.
- b) Discuss structural properties of biomaterials.
- c) Who coined the term nanobiotechnology?
- d) Explain buckyballs interface with biological macromolecules.
- e) Explain nanostructure assembly using DNA.
- f) Define nanotubes.
- g) Explain the functions of nanobioelectronic devices.
- h) Discuss the limitations of protein-based nanostructures.
- i) Write a short note on microbial production of inorganic nanoparticles.
- j) Explain the impact of nanomaterials on immune system.

SECTION-B

2. Discuss the role of nanobiotechnology in food processing sector.
3. Explain :
 - a) Nanotubes
 - b) Conjugates of gold nanoparticles
 - c) Polymer nanocontainers.
4. Explain topographic and electrostatic properties of DNA and proteins.
5. How modifications of DNA are helpful in nanotechnological applications.
6. Write in detail about the various nanomaterials used in biotechnology.
7. Discuss the various opportunities and promises of nanotechnology in biotechnology sector.
8. Discuss the applications of nanotechnology in the development of nanofertilizers.

SECTION-C

9. Define nanobiotechnology. Explain its scope and applications in agriculture.
10. What are quantum dots? Explain the application of integration of nanotechnology with biology in smart packaging.
11. Discuss DNA based nanostructures and their applications in various biotechnological sectors.

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Roll No.

Total No. of Questions : 11

Total No. of Pages : 02

M.Sc. (BT) (Sem.-1)

ENVIRONMENT BIOTECHNOLOGY

Subject Code : MBT-111

M.Code : 75664

Date of Examination : 18-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is **COMPULSORY** consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Describe briefly :

- a) Waterborne diseases
- b) Aerated lagoons
- c) Phytoremediation
- d) Bioremediation
- e) PAH
- f) Biosurfactants
- g) Biofertilizers
- h) Biopesticides
- i) Biofuels
- j) Biomedical waste .

SECTION-B

2. Describe various indicators of environmental pollution.
3. Draw a well labeled diagram showing principle and working of rotating biological contactors.
4. Describe the mechanism and importance of phytoremediation.
5. Give a brief account of the methods used to treat dairy industry waste.
6. Draw a comparison between methods of production and nutritive profiles of biocompost and vermicompost.
7. Provide a short description of the methods used to degrade lignocellulosics.
8. Give a flow chart depicting various methods used for the treatment of municipal waste.

SECTION-C

9. Explain underlying principle and applications of metagenomics in the field of environmental biotechnology.
10. Give a detailed account of the production of biofuels from agricultural or lingo-cellulosic waste materials.
11. Write a comprehensive note on the innovative techniques used for the prevention and control of environmental pollution.



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Roll No.

Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. (BT) (Sem.-1)
ENVIRONMENT BIOTECHNOLOGY
Subject Code : MBT-111
M.Code : 75664
Date of Examination : 18-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

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SECTION-A

1. Describe briefly :

- a) Waterborne diseases
- b) Aerated lagoons
- c) Phytoremediation
- d) Bioremediation
- e) PAH
- f) Biosurfactants
- g) Biofertilizers
- h) Biopesticides
- i) Biofuels
- j) Biomedical waste .

SECTION-B

2. Describe various indicators of environmental pollution.
3. Draw a well labeled diagram showing principle and working of rotating biological contactors.
4. Describe the mechanism and importance of phytoremediation.
5. Give a brief account of the methods used to treat dairy industry waste.
6. Draw a comparison between methods of production and nutritive profiles of biocompost and vermicompost.
7. Provide a short description of the methods used to degrade lignocellulosics.
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SECTION-C

9. Explain underlying principle and applications of metagenomics in the field of environmental biotechnology.
10. Give a detailed account of the production of biofuels from agricultural or lingo-cellulosic waste materials.
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Total No. of Questions : 11

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M.Sc. (BT) (Sem.-1)

COMPUTER APPLICATIONS

Subject Code : MBT-105

M.Code : 75663

M.Code : 75663
Date of Examination: 15-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. SECTION-B contains **SEVEN** questions carrying **SIX** marks each and students have to attempt any **FIVE** questions.
3. SECTION-C contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION-A

1. Write a brief note on :

- a) Control Unit
- b) USB device
- c) Internet
- d) Uses of databases in biotechnology
- e) Compilers
- f) Example of a formula for calculation in spreadsheets
- g) Polymorphism
- h) OOPs
- i) Indents in word processing
- j) Conversion of 459.2 in binary.

SECTION-B

2. Draw and explain the block diagram of a computer.
3. Discuss the features of a DBMS.
4. Describe various data storage devices.
5. Discuss the need for overloading functions in programming.
6. Discuss the different paragraph formatting options in word processors.
7. Discuss the concept of classes and objects in C++.
8. Describe different categories of functions in spreadsheet packages.

SECTION-C

9. Describe different types of control structures in C++.
10. Describe application software and system software with their types.
11. Describe how data is sorted and filtered in spreadsheets?

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. (BT) (Sem.-1)
GENETICS AND MOLECULAR BIOLOGY
Subject Code : MBT-103
M.Code : 75661

Date of Examination : 13-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

I. Write briefly :

- a) Mendelian inheritance
- b) Linkage and crossing over
- c) Germinal mutations
- d) Pedigree
- e) Polyploidy
- f) Polygenic inheritance
- g) QTLs
- h) Telomere
- i) DNA polymerases
- j) RNA polymerases.

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SECTION-B

2. Explain the concept of extra-chromosomal inheritance using suitable examples.
3. Provide a brief account of the types, causes and detection of mutations.
4. Describe the principle and applications of QTL mapping.
5. Explain the properties of accessory proteins that ensure correct replication of DNA.
6. Give an overview of the types of RNA and their properties.
7. What are translation factors? Describe their importance in protein synthesis.
8. Write notes on pedigree analysis and karyotyping and their applications in the field of human genetics.

SECTION-C

9. Give a detailed account of the structural and numerical alterations in DNA and their consequences. What is ploidy? Explain briefly about its genetic implications.
10. Explain the complexity, organization and method of replication of eukaryotic genomes.
11. Describe the mechanism of eukaryotic transcription process. Give an overview of the important post-transcriptional modifications carried out in primary transcript after its synthesis.

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DEL-2023

Roll No.

Total No. of Questions : 11

Total No. of Pages : 02

M.Sc. (BT) (Sem.-1)
APPLIED MICROBIOLOGY
Subject Code : MBT-102
M.Code : 75660
Date of Examination : 11-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Describe briefly:

- a) Draw the growth curve of a bacteria and label different phases of growth.
- b) Name any two fermentative microorganisms.
- c) Draw a neatly labelled structure of an animal virus.
- d) Write any two nitrogen sources used for industrial fermentation.
- e) What is critical dilution rate?
- f) Define generation time of bacteria. How is it calculated?
- g) What is the role of metabolic gene clusters in microbes?
- h) What are the applications of fed-batch fermentation?
- i) What are thermophiles? What is their significance?
- j) Name any two common food-borne pathogens.

SECTION-B

2. Describe the growth cycle of a virus.
3. Discuss various techniques used for the sterilization of media for industrial fermentation.
4. Write a note on lactic acid fermented food.
5. Give an account on bacteriophages.
6. Describe the substrates used for industrial production of ethanol.
7. Discuss the economic significance of yeasts.
8. How bacterial pathogens colonize the hosts and invade their tissues? Explain.

SECTION-C

9. Write a note on improvement of industrially important strains.
10. Describe the aerobic respiration in microbes.
11. Discuss the classification and structural organization of microbes.

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Total No. of Questions : 11

Total No. of Pages : 02

M.Sc. (BT) (Sem.-1)
BIOMOLECULES AND METABOLISM

Subject Code : MBT-101

M.Code : 75659

Date of Examination : 08-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Attempt all parts :

- a) Complex lipids
- b) Pyruvate kinase
- c) Chemiosmosis
- d) Role of myoglobin
- e) Lineweaver-Burk plot
- f) Uncompetitive inhibition
- g) Purpose of PCR
- h) Significance of $FADH_2$
- i) Conversion of alpha-ketoglutarate to succinate
- j) Biological functions of carbohydrates

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SECTION-B

2. What are different levels of structure of protein? Explain.
3. Write a short note on enzyme classification.
4. a) Differentiate between reducing and non-reducing sugars.
b) Write about components of oxidative phosphorylation in brief.
5. Describe in detail about different types of enzyme inhibition.
6. Lipids are classified into how many classes? Explain with examples.
7. Write about chemical synthesis of DNA.
8. Write a short note on Beta oxidation of lipids.

SECTION-C

9. Discuss about various techniques to purify proteins in detail.
10. a) Give an account of biomembranes and its functions.
b) Draw well labeled Citric acid cycle.
11. What are the steps involved in purine metabolism? Give detail.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. (BT) (Sem.-2)
IMMUNOLOGY AND IMMUNOTECHNOLOGY
Subject Code : MBT-202

M.Code : 76246
Date of Examination : 17-11-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a. Tumor antigens
- b. Blast formation
- c. Autoimmunity
- d. MHC restriction
- e. Immunocytochemistry
- f. Antibody dependent cell mediated cytotoxicity
- g. Immunosuppressive therapy
- h. Hybridoma
- i. Oncogenes
- j. Class switching.

SECTION-B

2. Write a note on the lymphoid cells of the immune system.
3. Explain the genomic organization of MHC genes.
4. Describe the clinical manifestations of Transplantation.
5. Write the principle and applications of ELISA.
6. Discuss any one cytokine related disease.
7. Draw a well labelled diagram showing the structure of MHC II.
8. Explain the process of phagocytosis by macrophages.

SECTION-C

9. Write a note on B cell maturation and rearrangement of Immunoglobulin genes.
10. Explain the Immunological basis of graft rejection.
11. Discuss the generation of Antibody diversity.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. (Biotechnology) (Sem.-2)
CELL AND DEVELOPMENTAL BIOLOGY

Subject Code : MBT-201

M.Code : 76245

Date of Examination : 23-11-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer in brief :

- a) C Value paradox
- b) Induction
- c) Determination
- d) Cytoskeleton
- e) Eye lens induction
- f) Malignant Growth
- g) Senescence
- h) Embryogenesis
- i) Morphology
- j) Glyoxisomes.

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SECTION-B

2. Give an overview on the role of Endoplasmic Reticulum in glycosylation.
3. What is the implication of Fluid mosaic model of the membrane?
4. Describe the functions of chromosome.
5. Explain the concept of aging and senescence.
6. Explain the structure of Nuclear pore complex.
7. What is Gastrulation? Explain the formation of three germ layers.
8. Write a note on Pattern formation in Drosophila.

SECTION-C

9. Discuss the packaging of chromatin into chromosomes.
10. Write a note on the embryo sac development and double fertilization in plants.
11. Explain the limb development and regeneration in vertebrates.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. Biotechnology (Sem.-2)
MOLECULAR CARCINOGENESIS AND THERAPY
Subject Code : MBT-213
M.Code : 76252
Date of Examination : 21-11-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

I. Answer briefly :

- a) What are Carcinogens?
- b) How are cell lines established from primary cells?
- c) What is mitosis and when does it occur in cell cycle?
- d) How do growth factors influence the cell proliferation?
- e) What are the key characteristics of cancer cells?
- f) What are RNA tumor viruses and how do they cause cancer?
- g) What are the roles of protooncogenes in cancer development?
- h) What are K-ras genes?
- i) Write a short note on retinoblastoma gene 1.
- j) How are false positives and false negatives minimized in primary screening?

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SECTION-B

2. Explain the different stages of cell cycle.
3. What are the secondary messengers? Explain the IGF and EGF interactions.
4. How does fusion gene BCR-ABL contribute to the development of cancer and how can they be targeted for therapy?
5. Discuss the role of mutations in oncogenes and tumor suppressor genes in the development of cancer. How do the mutations affect the behaviour of cancer cells?
6. What is large T antigen and explain the type of cancer in which it is involved?
7. Explain the types of changes observed in cells during cancer development.
8. What are the potential long term consequences and complications of cervical carcinoma and its treatment?

SECTION-C

9. Describe the principles of cancer gene therapy. Discuss the potential advantages and challenges associated with gene therapy in cancer treatment.
10. What are human cancer viruses? Describe how these viruses are associated with specific type of cancer.
11. What are oncogenes and how they contribute to the development of cancer? Discuss the mechanism by which oncogenes promote uncontrolled cell growth and tumor formation.

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Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. (BT)(Sem.-2)
ENZYME TECHNOLOGY
Subject Code : MBT-203
M.Code : 76247
Date of Examination : 28-11-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

- INSTRUCTIONS TO CANDIDATES :**
1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
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SECTION-A

1. Describe briefly :
 - a) What are Holoenzymes and Prosthetic groups?
 - b) Define SI units of enzyme Activity.
 - c) What is Product Inhibition? Give example.
 - d) Define Active Site.
 - e) Define Absolute and Group specificity.
 - f) What is Sigmoidal kinetics?
 - g) What are Marker enzymes?
 - h) What is Pre Steady State kinetics?
 - i) What are Substrate analogues? Give example and application.
 - j) What is Covalent catalysis and Metal ion Catalysis?

SECTION-B

2. Discuss general properties of enzymes.
3. Write a note on Active site .
4. What is LineWeaver Burk Equation and what is its significance?
5. What are immobilized Enzymes? List Advantages of immobilization.
6. What is Cellular compartmentalization of enzymes? Discuss.
7. Write a note on Plasma enzymes.
8. Write a note on Allosteric Regulation of Enzymes.

SECTION-C

9. Derive and Discuss Steady state rate equation (Linear Kinetics).
10. Deliberate on kinetics of Multisubstrate Enzyme Catalyzed reaction.
11. Elaborate on extraction and purification methods for enzymes.

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Roll No.

Total No. of Pages : 02

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M.Sc. (BT) (Sem.-3)
FOOD BIOTECHNOLOGY
Subject Code : MBT-312
M.Code : 76734

Date of Examination : 18-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

I. Write briefly :

- a) What is an amperometric biosensor? Give example.
- b) Name any two pigment producing microbes.
- c) What are probiotics and prebiotics?
- d) What are lactic acid fermented food?
- e) What are industrial uses of beta galactosidase?
- f) Define nutraceutical products.
- g) What are complex carbohydrates?
- h) What are the benefits of nutritional genomics?
- i) Give uses of xanthan gum.
- j) Give two examples of modified functional food.

SECTION-B

2. Discuss the biotechnological approaches for the production of food flavours.
3. Describe the innovations and developments in protein engineering, with glucose isomerase as an example.
4. Write a note on microbial production of organic acids and their use in food industry.
5. Describe the properties of nisin.
6. Discuss the markers for the development of functional food.
7. Explain the different classes of nutraceuticals with specific examples.
8. Describe the concept of nutrigenomics.

SECTION-C

9. Discuss the applications of biosensors in food processing.
10. Give an account on limitations and applications of engineering techniques in food technology.
11. Write a note on biopreservatives.

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Roll No.
Total No. of Questions : 11

Total No. of Pages : 02

M.Sc. (BT) (Sem.-3)
FOOD BIOTECHNOLOGY
Subject Code : MBT-312
M.Code : 76734
Date of Examination : 18-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

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SECTION-A

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- a) What is an amperometric biosensor? Give example.
- b) Name any two pigment producing microbes.
- c) What are probiotics and prebiotics?
- d) What are lactic acid fermented food?
- e) What are industrial uses of beta galactosidase?
- f) Define nutraceutical products.
- g) What are complex carbohydrates?
- h) What are the benefits of nutritional genomics?
- i) Give uses of xanthan gum.
- j) Give two examples of modified functional food.

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SECTION-B

2. Discuss the biotechnological approaches for the production of food flavours.
3. Describe the innovations and developments in protein engineering, with glucose isomerase as an example.
4. Write a note on microbial production of organic acids and their use in food industry.
5. Describe the properties of nisin.
6. Discuss the markers for the development of functional food.
7. Explain the different classes of nutraceuticals with specific examples.
8. Describe the concept of nutrigenomics.

SECTION-C

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10. Give an account on limitations and applications of engineering techniques in food technology.
11. Write a note on biopreservatives.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. (Bio Technology) (Sem3)
IPR, GOOD LAB PRACTICES AND BIOETHICS

Subject Code : MBT-304

M.Code : 76731

Date of Examination : 15-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) What are the basic requisites of patentability?
- b) Give two examples of non-patentable inventions.
- c) Define
 - i. Patents
 - ii. Trademarks
- d) Define
 - i. Creativity
 - ii. Novelty.
- e) Discuss essential elements of IPR.
- f) Discuss possible risks of TKDL briefly.
- g) Write a short note on safety levels.
- h) Discuss the importance of ethical issues in patenting.

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- i) Discuss the various forms of traditional knowledge.
- j) Write a note on ownership of tangible and IP.

SECTION-B

2. Define bioethics. What are the different bioethical issues concerned with biotechnology research and development?
3. Discuss about 'Good Lab Practices' to be followed in the 6 biotechnology laboratory for safety assurance.
4. a) Define IP and IPR. What are patent claims? Discuss with a suitable example.
b) Discuss creation and management of IP.
5. Explain in detail :
 - a) USPTO
 - b) Non-obviousness
 - c) Patent search.
6. What is patentable in Biotechnology? Explain by giving suitable examples. How to file patent in India?
7. Discuss biosafety levels in context to biotechnology.
8. Write a detailed note on knowledge management IPR databases- WIPO.

SECTION-C

9. Explain characteristic feature of IP. What are current issues on IPR? Explain them in detail.
10. Enumerate the procedure to handle chemicals, biochemicals, radioisotopes and toxic chemicals.
11. Discuss special ethical issues in biotechnological patenting. Explain ethical issues and disclosure requirements.

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Roll No.

Total No. of Questions : 11

Total No. of Pages : 02

M.Sc (BT) (Sem-3)
GENETIC ENGINEERING
Subject Code : MBT301
M.Code : 76728
Date of Examination : 08-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

I. Write Briefly :

- a) Colony hybridization.
- b) Nucleic acid probes.
- c) Comparison of plasmid and phagemid vectors.
- d) Intein based vectors.
- e) Genomic cloning.
- f) Ti vector.
- g) Jumping libraries.
- h) PCR.
- i) Si RNA.
- j) Transgenics.

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SECTION-B

2. Explain theory and applications of Southern hybridization.
3. Compare the genetic and restriction features of bluescript and cosmid vectors.
4. Highlight the important strategies of recombinant protein purification using suitable examples.
5. Describe the importance and methods of preparing jumping libraries.
6. Briefly explain genetic and regulatory features of important vectors used to achieve gene expression in plant cells.
7. Write a detailed note on principle and applications of PCR technique.
8. Discuss the importance of gene knockouts in genetic engineering.

SECTION-C

9. What are gene libraries? Explain the various strategies to construct gene libraries using a suitable cloning vector.
10. Explain principles, procedures and applications of automated DNA sequencing.
11. Write a well-illustrated note on SiRNA technology and its applications.

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Total No. of Pages : 02

Total No. of Questions : 11

M.Sc (Biotechnology) (Sem.-3)
GENOMICS AND PROTEOMICS
Subject Code : MBT-303
M.Code : 76730

Date of Examination: 13-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

- INSTRUCTIONS TO CANDIDATES :**
1. **SECTION-A** is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
 2. **SECTION-B** contains **SEVEN** questions carrying **SIX** marks each and students have to attempt any **FIVE** questions.
 3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION-A

1. Answer briefly :
- Orthologues
 - Any two properties of a DNA polymerase that makes it suitable for use in Chain termination sequencing.
 - Define ESTs
 - cDNA microarrays
 - Isoelectric focusing
 - Peptide mass fingerprinting
 - Name any two Genome databases
 - Transcriptome
 - Genome sequencing
 - Proteinases.

SECTION-B

2. Outline how Genome is sequenced by Shotgun sequencing.
3. Explain Genome structure in Eukaryotes.
4. Discuss the principle and applications of 2D-PAGE.
5. What is significance of Functional Genomics?
6. Explain the working of a MALDI-TOF along with a diagram
7. Describe briefly the significance and applications of Microarray technology
8. What is Co-immuno precipitation?

SECTION-C

9. Give the principle of Sanger's sequencing technique. Illustrate the steps involved in sequencing experiment.
10. Discuss Proteomics and the significance of proteome analysis.
11. Write a note on Protein separation techniques.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 11

M.Sc. (BT) (Sem.-3)
CLINICAL RESEARCH
Subject Code : MBT 313
M.Code : 76735

Date of Examination : 20-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SEVEN questions carrying SIX marks each and students have to attempt any FIVE questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

I. Write briefly :

- a) Difference between clinical research and clinical practice.
- b) Define clinical research.
- c) Discuss the advantages of uncontrolled trials.
- d) Discuss key components of trial protocol.
- e) Discuss the objectives and prerequisites for human pharmacology.
- f) Explain the procedure for conducting phase I studies of clinical research.
- g) Write a short note on ICH and its purposes.
- h) Explain the advantages and challenges in conducting phase II clinical trials.
- i) Define PMS and PSUR.
- j) Discuss benefits of ICH.

SECTION-B

2. Discuss ICH guidelines for good clinical practices in detail.
3. Explain in detail ICH harmonization process.
4. Discuss phases of clinical research in detail.
5. **Explain :**
 - a) Clinical trial protocol and protocol amendments.
 - b) Essential documents for the conduct of a clinical trial.
6. Discuss benefits of PMS and why there is need of PMS system in clinical research.
7. Define IB. Discuss the contents of IB in detail.
8. Discuss the composition, responsibilities and procedures of IRB/IEC.

SECTION-C

9. Describe the origin and history of clinical research.
10. Define clinical trials. Discuss the current status of clinical trials in India.
11. Explain the process of designing and development of protocol for clinical trial.

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