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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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 :

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 .

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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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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

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   a) Waterborne diseases

   b) Aerated lagoons

   c) Phytoremediation

   d) Bioremediation

   e) PAH

   f) Biosurfactants

   g) Biofertilizers

   h) Biopesticides

   i) Biofuels

   j) Biomedical waste .

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SECTION-B

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

COMPUTER APPLICATIONS

Subject Code : MBT-105

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.
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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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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

1. 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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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.

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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 an 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 claissification and structural organization of microbes.

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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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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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Total No. of Questions : 11

M.Sc. Biotechnology (Sem.-2)

MOLECULAR CARCINOGENESIS AND THERAPY

Subject Code : MBT-213

M.Code : 76252

Date of Examiantion : 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

1. 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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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 :

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.
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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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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

1. **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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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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   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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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.

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

BIOSTATISTICS

Subject Code : MBT302

M.Code : 76729

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. **Write briefly :**

   a) Calculate the mean for the data 15,7,5,8,9,6, and 3.

   b) Define error .

   c) Define standard deviation .

   d) Define degrees of freedom .

   e) Define mode.

   f) Define p Value and its significance in biostatistics .

   g) Define biostatistics.

   h) Write one importance of chi square test.

   i) What is the probability that a leap year selected at random will contain 53 Sundays?

   j) Write the significance of F test.

SECTION-B

2. Write a note on least squares.

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3. From the data given below about the treatment of 250 patients suffering from a disease state whether the new treatment is superior to the conventional treatment :

Treatment	No. of Patients		
	Favourable	Not Favourable	Total
New	140	30	170
Conventional	60	20	80
Total	200	50	250

(Given for Degrees of Freedom =1 Chi square 5% = 3.84)

4. Obtain the regression equations for the given data (X on Y and Y on X equations)

X:	6	2	10	4	8
Y:	9	11	5	8	7

5. A problem in mathematics is given to five students A, B, C, D and E. Their chances of solving it are 1/2,1/3,1/4,1/5 and 1/6. What is the probability that the problem will be solved?

6. Give an account of F test.

7. Enlist the applications of biostatistics in biotechnology.

8. Describe in brief about non-parametric tests.

SECTION-C

9. Perform one way Analysis of variance for the given following data:

Schools		
A	B	C
3	4	5
7	5	6
5	3	7

Is there any significant difference between schools or not. [$F^{0.05}(2,6)$ is 5.14.]

10. a) The following mistakes per page were observed in a book :

No. of mistakes per page	0	1	2	3	4
No. of times the mistake occurred	211	90	19	5	0

Fit a position distribution to fit data. (Given $e^{-0.439} = 0.6447$)

b) Write a note on regression.

11. **Write a note on :**

   a) Randomised block design

   b) t-Test.

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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

1. **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 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 :

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) Orthologues

   b) Any two properties of a DNA polymerase that makes it suitable for use in Chain termination sequencing.

   c) Define ESTs

   d) cDNA microarrays

   e) Isoelectric focusing

   f) Peptide mass fingerprinting

   g) Name any two Genome databases

   h) Transcriptome

   i) Genome sequencing

   j) Proteinases.

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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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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

1. **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 1 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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