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

IMMUNOLOGY AND IMMUNOTECHNOLOGY

Subject Code : MBT-202

M.Code : 76246

Date of Examination : 19-05-2025

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) Complement system

   b) Autoimmune disease

   c) Differentiate between T and B lymphocytes.

   d) Name two circulating dendritic cells.

   e) Differentitae between innate and acquired immunity.

   f) Name most abundant antibody present in serum and give its functions.

   g) What are hetrophile antigens? Give examples.

   h) Give importance of haemagglutination in blood typing.

   i) Where are class III MHC genes located?

   j) Differentiate between autograft and isograft.

SECTION-B

2. Discuss molecular structure of antibodies.
3. Discuss general characteristics of cytokines.
4. Discuss cells and tissues of the immune system with relevant diagram.
5. Discuss structure of class IMHC molecules.
6. Explain immunologic basis of graft rejection.
7. Discuss principle and procedure of hybridoma technology.
8. Discuss immune-electro phoresis and its modifications.

SECTION-C

9. Discuss stages of B-cell development in detail.
10. Discuss various approaches used for immunotherapy of cancer.
11. **Write short note on the following:**

    a) ELISA

    b) Structure of TCR.

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

ENZYME TECHNOLOGY

Subject Code : MBT-203

M.Code : 76247

Date of Examination : 22-05-2025

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 the following :**

   a) How ligases differ from lyases?

   b) How does the structure of oligomeric enzymes contribute to their function and regulation?

   c) Explain how substrate concentration affects the activity of enzymes.

   d) What is the International Unit (IU) system of enzymes?

   e) How temperature and pH affect the activity of enzymes?

   f) What are co-enzymes?

   g) How are enzymes used in the treatment of diseases?

   h) What is the difference between homotropic and heterotropic cooperativity?

   i) What is sub-cellular compartmentalization?

   j) How are enzymes used in food processing?

SECTION - B

2. How do co-factors and co-enzymes affect enzyme structure and function?

3. How does the Lineweaver-Burk plot provide insights into enzyme kinetics?

4. Compare and contrast the kinetic properties and regulatory mechanisms of lactate dehydrogenise and lactate syntheses.

5. What are the main methods of enzyme immobilization?

6. Describe the role of enzymes in food and beverage production.

7. What are the key assumptions made in steady-state enzyme kinetics?

8. What is the role of substrate specificity in enzyme structure?

SECTION - C

9. What are the principle, advantages and limitations of each model in explaining enzyme-substrate interactions and catalytic mechanisms?

10. How do models like the Manod-Wyman-Changeux and sequential model differ in their explanation of allosteric regulation and cooperativity?

11. Explain the distinguishing features and mechanisms of main types of enzyme inhibition along with the examples.

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M.Sc. Biotechnology (Sem.-2)

BIOPROCESS ENGINEERING

Subject Code : MBT-205

M.Code : 76249

Date of Examination : 26-05-2025

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 and fed batch fermentation.

   b) Principle of centrifugation.

   c) Reverse osmosis and its uses.

   d) Pasteurization

   e) Crystallization

   f) Role of baffles in fermenter.

   g) Biocolors

   h) Catabolite repression

   i) Synchronous culture

   j) Role of Biosensors in bioprocessing.

SECTION - B

2. What are pneumatic and hydrodynamic fermenters.

3. Describe the concept of solid, surface and submerged fermentations.

4. What is Reverse osmosis and explain its applications in bioseparation processes.

5. Describe the concept and significance of dissolved oxygen in bioreactor processes.

6. Discuss about various sterilization techniques used to sterilized media and equipment at industry level.

7. Explain the concept of microbial growth and death kinetics with the help of diagram.

8. Write a note on bacteriocin production and its applications.

SECTION - C

9. Describe various microbial based methods used for treatment of effluents.

10. What do you mean by inline, online and offline measurements? Write about various methods and equipment used for measurement and control of bioprocess parameters.

11. **Write a detailed note on the following :**

    a) Scope of starch-based waste products for their conversion to useful products.

    b) Purification by chromatographic techniques.

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M.Sc. Biotechnology (Sem.-2)

PLANT TISSUE CULTURE

Subject Code : MBT-211

M.Code : 76250

Date of Examination: 29-05-2025

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 the sources of Protoplast?

b) What is the role of antibiotics used in culture media in Plant Tissue Culture?

c) What are the ethical considerations of Transgenic Plants?

d) What are Elicitors? Give classification.

e) What are the physiological effects of Ethylene (Plant Hormone)?

f) What is the objective of Cryopreservation?

g) What are the advantages and limitations of Somaclonal Variation?

h) Where are Auxins synthesized in Plant?

i) What is the purpose of Chromosome Elimination?

j) What is Synthetic Seed?

SECTION - B

2. What are the different elements of Plant Tissue culture? Discuss the role of micronutrients and carbohydrates in culture media.

3. What are the types of Transgenic Plants? Give their future perspectives.

4. Describe biosynthesis of Gibberellins.

5. What are the causes of Somaclonal Variations?

6. What is the importance of Microspore Culture? Give its protocol, advantages and disadvantages.

7. Discuss *'Tissue Culture Technique for plant improvement'*.

8. **Write short notes on :**

a) Diploid plants

b) Biotransformation.

SECTION-C

9. Describe various methods for *in vitro* production of secondary metabolites.

10. What are Plant Growth regulators? Give physiological effects and mechanism of actions of Auxins and Cytokinins.

11. What is Micropropagation process? Give its advantages, disadvantages and applications.

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M.Sc. Biotechnology (Sem.-2)

MOLECULAR CARCINOGENESIS & THERAPY

Subject Code : MBT-213

M.Code : 76252

Date of Examination: 03-06-2025

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) Mention the role of retroviruses in cancer.

   b) What are Oncogenes?

   c) What are growth factors? Give examples.

   d) What is Hodgkin's disease?

   e) What are tumour suppressor proteins? Give examples.

   f) Highlight role Papiloma virus as cancer virus.

   g) What is bronchogenic carcinoma?

   h) What are H-ras & K-ras genes?

   i) What is erythropoietin?

   j) Mention any two human carcinogens.

SECTION-B

2. Explain the growth characteristics of cancer cells.
3. Write a note on chemical carcinogens.
4. Write a note on tumour suppressor gene p53 and its role in tumour development.
5. Add a note on mutation in proliferating cells.
6. Write a short note on gene therapy of cancer.
7. Add a note on cancer vaccines and their current status.
8. Give a brief account on multi-drug resistance and cancer chemotherapy.

SECTION - C

9. Discuss in detail about carcinogenesis.
10. What are the products of oncogenes? Mention their role in cancer progression.
11. Discuss chemotherapy of Hodgkin's disease and lymphosarcoma.

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

CELL AND DEVELOPMENTAL BIOLOGY

Subject Code : MBT-201

M.Code : 76245

Date of Examination : 05-05-2025

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) What are receptors?

   b) What is the site of lipid biosynthesis in eukaryotes?

   c) What is cot curve? What is its significance?

   d) What is necrosis? Which factors induce cell necrosis?

   e) Define differentiation, de-differentiation and re-differentiation.

   f) What are the key regulators for the development of symmetry in plants?

   g) Define gastrulation.

   h) What is malignant neoplasm?

   i) Draw a diagram depicting zygote formation in plant.

   j) Describe the structure and organization of shoot apex.

SECTION-B

2. Write a note on cell signalling pathway.

3. Describe the structure and function of Golgi apparatus.

4. Discuss the process of development of embryo sac in plants.

5. Explain the induction and differentiation of eye lens in vertebrates.

6. Write a note on structure and organization of chromosomes.

7. What is meant by pattern formation? Explain the process of pattern formation and cell aggregation in Drosophila.

8. Discuss the structure and function of plasma membrane.

SECTION-C

9. Describe organogenesis in context of vulva formation in Caenorhabditis elegans.

10. Write in detail the molecular organization and function of cytoskeletal elements.

11. **Write short notes on:**

    a) Cell lineages

    b) Programmed cell death.

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