

R3612

Sub. Code

24MBM3C1

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Biomedical Science

IMMUNOLOGY

(CBCS – 2024 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. What are the signaling molecules of the immune system? (CO1, K1)
(a) Chemokines (b) Cytokines
(c) Transmitters (d) Antigens
2. Natural killer (NK) cells do not: (CO1, K2)
(a) Contain perform
(b) Contain serine proteases
(c) Contain tumor necrosis factor (TNF)
(d) Kill only by damaging the target cell outer membrane
3. Which organ from among the following is related to T cells? (CO1, K1)
(a) Thymus (b) MALT
(c) Bone marrow (d) Spleen

4. Which cells are responsible for producing antibodies? (CO2, K2)
- (a) T cells (b) B cells
(c) Macrophages (d) Mast cells
5. Which of the following cells of the immune system do not perform phagocytosis? (CO1, K1)
- (a) Macrophages (b) Neutrophils
(c) Lymphocytes (d) Dendritic cells
6. What is the role of the T cells in the immune response? (CO3, K2)
- (a) Producing antibodies
(b) Identifying and destroying infected cells
(c) Producing mucus
(d) Regulating body temperature
7. Which type of immunity is conferred by vaccination? (CO1, K1)
- (a) Innate immunity (b) Adaptive immunity
(c) Passive immunity (d) Active immunity
8. Which of the following interact with MHC I molecules? (CO3, K2)
- (a) CD4 (b) CD8
(c) CD19 (d) CD25
9. What is immunological memory? (CO1, K1)
- (a) The immune system's ability to remember previously encountered pathogens
(b) The memory of the immune system's structure
(c) The duration of an immune response
(d) The number of immune cells in the body

10. Which of the following is NOT an autoimmune disease?
(CO4, K2)
- (a) Diabetes (b) Rheumatoid Arthritis
(c) Multiple Sclerosis (d) AIDS

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Explain difference between the innate and adaptive immunity. (CO1, K2)

Or

- (b) Describe the structure and function of antibody. (CO2, K4)

12. (a) What is the antigen presenting cells? (CO3, K2)

Or

- (b) Explain the process of clonal selection and expansion of lymphocytes. (CO2, K4)

13. (a) What are cytokines? (CO4, K2)

Or

- (b) What is self-tolerance? (CO4, K2)

14. (a) Describe the mechanism of graft rejection. (CO4, K4)

Or

- (b) Explain the vaccination and how it induces long term immunity. (CO1, K4)

15. (a) Explain the immunofluorescences with suitable example. (CO5, K3)

Or

- (b) Explain ELISA. (CO5, K3)

Part C

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Explain the Major immune histocompatibility in detail with suitable examples. (CO3, K4)

Or

- (b) Describe the detail about the mechanism of T cell activation. (CO3, K4)

17. (a) Explain the immunodeficiency in detail with suitable examples. (CO4, K4)

Or

- (b) Explain the regulation of immune response in detail. (CO4, K4)

18. (a) Explain the hypersensitivity and allergic reaction with suitable examples. (CO4, K4)

Or

- (b) Explain the mechanism/methods of Monoclonal antibody production. (CO2, K5)

19. (a) Explain the hematopoiesis. (CO1, K2)

Or

- (b) Explain the autoimmunity with suitable example. (CO4, K4)

20. (a) Explain the immunoblotting in detail. (CO5, K4)

Or

- (b) Explain the whole animals imaging. (CO5, K4)

R3613

Sub. Code

24MBM3C2

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Biomedical Science

MEDICAL ONCOLOGY

(CBCS – 2024 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. Neoplasia literally means (CO3, K4)
(a) New growth (b) Expanded growth
(c) Rapid growth (d) None of the above
2. Fibrosarcoma is a (CO2, K4)
(a) Benign tumor
(b) Malignant tumor
(c) Endothelial related tumor
(d) Muscle tumor
3. The following are chemical carcinogens except (CO2, K4)
(a) Aflatoxin (b) Nitrosamine
(c) Benzopyrene (d) NAA
4. UVB induced cancers cause mutations at _____ sequence within DNA. (CO2, K4)
(a) Dipyridimine (b) Dithymidine
(c) Purine (d) Uracil

5. Which cell to cell interaction prevent movement of water and water soluble molecules between cells? (CO1, K2)
- (a) Desmosomes
 - (b) Gap junctions
 - (c) Adheren junctions
 - (d) Tight junctions
6. In which stage of cell cycle, the cell exists in quiescent state? (CO1, K2)
- (a) G1 phase
 - (b) G2 phase
 - (c) S phase
 - (d) G0 phase
7. In which stage of cell cycle does DNA replication occurs (CO1, K2)
- (a) G1 phase
 - (b) G2 phase
 - (c) S phase
 - (d) G0 phase
8. There is fusion of 2 chromosomes at the centromere causing _____ translocation. (CO2, K4)
- (a) balanced
 - (b) unbalanced
 - (c) reciprocal
 - (d) robertsonian
9. _____ is a potential targer for cancer therapy (CO5, K5)
- (a) c-src
 - (b) proto oncogene
 - (c) v-src
 - (d) GF
10. Examples of natural immunomodulation mechanisms are all of the above except (CO5, K5)
- (a) cytokins
 - (b) regulatory T cells
 - (c) both (a) and (b)
 - (d) drugs

Part B

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Write a note on cell to cell interactions. (CO1, K2)
Or
(b) Write a brief note on important check points taking place in a cell cycle. (CO1, K2)
12. (a) Discuss in detail about chromosomal translocations and its types. (CO2, K4)
Or
(b) Explain the tumor classification in detail. (CO2, K4)
13. (a) Write a note on evasion of growth inhibitory signals. (CO3, K4)
Or
(b) Discuss on the effects of tumor in host. (CO3, K4)
14. (a) Explain colloid systems for delivery of anticancer agents. (CO4, K2)
Or
(b) Discuss cancer imaging techniques. (CO4, K2)
15. (a) Add a note on photodynamic therapy of cancer. (CO5, K5)
Or
(b) Discuss molecular basis of metastasis. (CO5, K4)

Part C

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Elaborate on the mechanism of dysregulation of cell cycle during cancer. (CO1, K2)
Or
(b) Define apoptosis. Explain the basic mechanism involved in pathophysiology of cancer. (CO1, K2)

17. (a) Define cancer. Write the difference between benign and malignant tumor. Add a note on metastasis. (CO2, K4)

Or

- (b) Discuss in detail about the relationship between oncogene products and growth factors in causing cancer. (CO2, K4)
18. (a) Elaborate on oncogenes and tumor suppressor genes. (CO3, K4)

Or

- (b) Define mutation. Classify mutagenic agents. Add a note on mutation causing loss of cell cycle control. (CO3, K4)
19. (a) What are nanoparticles and how it is used as an anticancer agent? (CO4, K2)

Or

- (b) Discuss recent advance in cancer diagnosis. (CO4, K2)
20. (a) Write a detailed note on cancer vaccines and its mechanism of action. (CO5, K5)

Or

- (b) Elaborate on immunotherapy used for cancer treatment. (CO5, K5)
-

R3614

Sub. Code

24MBM3E1

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Biomedical Science

**Elective – BIOMATERIALS AND TISSUE
ENGINEERING**

(CBCS – 2024 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. Which of the following is a key advantage of using Ti6Al4V for biomedical implants? (CO2, K2)
 - (a) High density
 - (b) Excellent biocompatibility and corrosion resistance
 - (c) Low strength
 - (d) Poor mechanical properties
2. Calcium phosphates and hydroxyapatite are examples of which type of biomaterial, often used for implant coatings due to their similarity to natural bone? (CO1, K2)
 - (a) Metals
 - (b) Polymers
 - (c) Bioceramics
 - (d) Composites

3. Which of the following is considered an undesirable host response to an implant? (CO1, K4)
- (a) Osseointegration
 - (b) Inflammatory chronic response
 - (c) Endothelial cell adhesion
 - (d) ECM deposition
4. A common undesirable reaction of the body to an implanted material is the formation of a fibrous capsule, a process known as (CO1, K4)
- (a) Tissue regeneration
 - (b) Biotransformation
 - (c) Encapsulation
 - (d) Homeostasis
5. Which of the following is a common mode of dental implant failure? (CO1, K4)
- (a) Enhanced osseointegration
 - (b) Implant migration
 - (c) Overgrowth of gingival tissue
 - (d) Per implantitis
6. Failure of a bladder implant can be caused by (CO1, K4)
- (a) Biofilm formation and infection
 - (b) Rapid degradation of the material
 - (c) Too little mechanical strength
 - (d) Adhesion to surrounding tissue

7. When cells recognize proteins adsorbed on a material surface this recognition can trigger subsequent processes like (CO2, K2)
- (a) Platelet aggregation
 - (b) Cellular differentiation and tissue regeneration
 - (c) Blood clotting
 - (d) Implant corrosion
8. The initial foreign body response to implants is mediated by: (CO1, K2)
- (a) Lymphocytes immediately
 - (b) Neutrophils and macrophages
 - (c) Osteoblasts first
 - (d) Chondrocytes
9. Which of the following is a natural Polymer often used in tissue engineering due to its biocompatibility and biodegradability? (CO2, K5)
- (a) Polyethylene
 - (b) Polylactic acid
 - (c) Collagen
 - (d) Titanium
10. Which stem cells are most commonly used in tissue engineering? (CO1, K5)
- (a) Embryonic stem cells
 - (b) Mesenchymal stem cells
 - (c) Germline stem cell
 - (d) Neural stem cells

Part B

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Explain the different types of biomaterials used in biomedical applications, along with their advantages and disadvantages. (CO1, K2)

Or

- (b) Discuss on implant-tissue interactions that determine implant success or failure. (CO1, K2)

12. (a) Explain in detail the mechanisms of desirable and undesirable host responses to implanted biomaterials. (CO2, K2)

Or

- (b) Describe with examples the modes and mechanisms of failure of orthopedic implants. (CO2, K4)

13. (a) Describe the modes of bladder implant failure and the materials used. (CO3, K4)

Or

- (b) Write in detail on the role of wear debris in implant failure in orthopedic applications. (CO3, K4)

14. (a) Describe the foreign-body response and its effect on implant performance. (CO2, K4)

Or

- (b) Explain the sequence of protein interactions with biomaterial surfaces after implantation. (CO4, K4)

15. (a) Discuss the properties and applications of natural polymers in biomedical applications. (CO5, K5)

Or

- (b) Describe the use of degradable polymers in scaffold fabrication and their advantages in tissue engineering. (CO5, K5)

Part C

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Explain the concept of implant-tissue interactions, highlighting cellular and extracellular responses leading to long-term implant success/failure. (CO1, K2)

Or

- (b) Discuss in detail the mechanical and biological properties of titanium alloys (Ti-6Al-4V) and their importance in orthopedic implants. (CO1, K2)

17. (a) Explain the concept of biocompatibility in detail. Discuss the factors that determine a material's biocompatibility and material's surface properties influence its interaction with biological systems. (CO3, K4)

Or

- (b) Discuss the role of nanomaterials in improving implant performance, with emphasis on surface modifications, bioactivity and integration. (CO2, K2)

18. (a) Describe the materials used for cartilage and vascular implants, their interaction with host tissue and common failure mechanisms. (CO3, K4)

Or

- (b) Explain the pathology of implant failure. Discuss the different modes of implant failure, such as mechanical failure, corrosion and infection and its biological consequences. (CO3, K4)

19. (a) Discuss the processes of adhesion, migration, differentiation, and ECM deposition, and their importance in tissue regeneration. (CO4, K2)

Or

- (b) Analyze critically the interplay between protein interactions, immune response, and tissue regeneration in implant success/failure. (CO4, K4)

20. (a) Discuss in detail the principles of tissue engineering, including stem cells, morphogenesis, tissue homeostasis, and cellular signaling. (CO5, K5)

Or

- (b) Provide a detailed essay on tissue engineering scaffold design: material selection, porosity, biodegradability, and bioactivity. (CO5, K5)
