**R1954**

**Sub. Code**
**24MBM1C1**

**M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024**

**First Semester**

**Biomedical Science**

**HUMAN ANATOMY AND PHYSIOLOGY**

**(CBCS – 2024 onwards)**

Time : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

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

1. Which of the following is responsible for cell division (CO1, K1)

   (a) centrioles (b) ribosomes

   (c) mitochondria (d) golgi apparatus

2. The neuroglia forming myelin sheath in peripheral nervous system is (CO2, K1)

   (a) ependymal cells (b) astrocytes

   (c) microglia (d) oligodendrocytes

3. Tricuspid valve is present in between. (CO2, K6)

   (a) right atrium and right ventricle

   (b) left atrium and left ventricle

   (c) veins

   (d) lymphatic vessels

4. The pump which maintains the cell volume is (CO1, K1)

(a) $H^+$ Pump

(b) $Ca^{2+}$ ATPase pump

(c) $Na^+K^+$ ATPase pump

(d) $I^-$ pump

5. The amount of air inspired and expired is called as (CO3, K2)

(a) inspiratory volume

(b) tidal volume

(c) vital capacity

(d) residual volume

6. Secretion of small intestine is called as. (CO3, K1)

(a) Ptyalin (b) Enterokinase

(c) Bile (d) Succus entricus

7. Steroid hormones are synthesized from (CO4, K1)

(a) starch (b) amino acids

(c) cholesterol (d) phenols

8. Inhibin is secreted from (CO4, K1)

(a) $\alpha$-cells (b) Thyroid follicular cells

(c) Sertoli cells (d) G-cells

9. Renin is secreted from (CO5, K1)

(a) Podocytes (b) JG cells

(c) Macula densa (d) Mesangial cells

10. Increase in the intra ocular pressure causes (CO5, K1)

(a) myopia (b) cataract

(c) hemianopia (d) glaucoma

**Part B** $(5 \times 5 = 25)$

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

11. (a) Draw the structure of eukaryotic cell and explain the functions of cell membrane. (CO1, K2)

Or

(b) Classify the formed elements of the blood and summarize their function. (CO1, K3)

12. (a) Draw the structure of a typical neuron and enumerate the function of nervous tissue. (CO2, K4)

Or

(b) Draw the structure of heart and write about the major blood vessels connected to the heart. (CO2, K3)

13. (a) Write short note on pulmonary function tests. (CO3, K3)

Or

(b) Define peristalsis. Write short note on the movements of small intestine. (CO3, K4)

14. (a) List out the hormones of anterior pituitary and describe the functions of growth hormone. (CO4, K4)

Or

(b) Draw the C.S of testis and write about the function of testes. (CO4, K3)

15. (a) Trace the taste pathway. (CO5, K3)

Or

(b) Define GFR, mention its normal value and enumerate the determinants of GFR. (CO5, K4)

## Part C (5 × 8 = 40)

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

16. (a) Explain the ionic basis of resting membrane potential. (CO1, K5)

Or

(b) What are blood groups? Explain about the ABO blood group system. (CO1, K5)

17. (a) Define blood pressure. Explain how blood pressure is regulated. (CO2, K4)

Or

(b) Define reflex and draw the diagram of reflex arc. Classify the reflexes with example. (CO2, K4)

18. (a) Describe the neural control of respiration and add a note on Cheyne-Stokes respiration. (CO3, K5)

Or

(b) Write in detailed about the digestion and absorption of fats. (CO3, K5)

19. (a) Explain the synthesis, secretion and transport of thyroid hormone. (CO4, K6)

Or

(b) Draw the structure of mature sperm and write in detail about various stages of spermatogenesis. (CO4, K5)

20. (a) Explain the mechanism behind the formation of concentrated urine. (CO5, K4)

Or

(b) Trace the visual pathway and add a note on errors of refraction. (CO5, K5)

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**R1955**

**Sub. Code**
**24MBM1C2**

**M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024**

**First Semester**

**Biomedical Science**

**MEDICAL BIOCHEMISTRY**

**(CBCS – 2024 onwards)**

Time : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

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

1. Glycogen storage diseases are primarily caused by defects in which of the following? (CO1, K1)

   (a) Protein metabolism

   (b) Fatty acid oxidation

   (c) Glycogen synthesis/degradation

   (d) Amino acid catabolism

2. Which of the following is not a disorder related to carbohydrate metabolism? (CO1, K4)

   (a) Pompe diseases

   (b) McArdle's diseases

   (c) Gaucher diseases

   (d) Fructose intolerance

3. Which enzyme deficiency is most commonly associated with hypertriglyceridemia? (CO2, K4)

(a) Lipoprotein lipase

(b) Glucose 6-Phosphatase

(c) Hexokinase

(d) Aldolase A

4. Which type of lipoprotein is primarily responsible for transporting cholesterol from the liver to peripheral tissue (CO2, K1)

(a) High density lipoprotein

(b) Low density lipoprotein

(c) Very low density lipoprotein

(d) Chylomicrons

5. An elevated creatinine level is most common indicative of which of the following conditions (CO3, K4)

(a) Liver failure

(b) Renal dysfunction

(c) Respiratory distress

(d) Pancreatitis

6. Hypoalbuminemia is commonly associated with which of the following condition (CO3, K4)

(a) Chronic liver diseases

(b) Hyperthyroidism

(c) Hypertension

(d) Osteoporosis

7. Which treatment is most commonly used to manage Orotic Aciduria? (CO4, K1)

(a) Allopurinol

(b) Uridine supplementation

(c) Folic acid

(d) Iron supplement

8. The hallmark feature of Reye's syndrome in the liver is (CO4, K1)

(a) Hepatic stenosis

(b) Cirrhosis

(c) Hepatitis

(d) Hepatocellular carcinoma

9. Which of the following is considered as organ specific autoimmune diseases (CO5, K3)

(a) Systemic lupus erythematosus

(b) Rheumatoid arthritis

(c) Type I diabetes mellitus

(d) Sjogren's syndrome

10. Which protein is often elevated in the cerebro spinal fluid of patients with multiple sclerosis (CO5, K4)

(a) Beta-2-microglobulin

(b) Myelin basic protein

(c) C-reactive protein

(d) Albumin

## Part B (5 × 5 = 25)

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

11. (a) Discuss the pathophysiology and management strategies for Steatorrhea. (CO2, K3)

Or

(b) Explain the difference between type I and II diabetes mellitus. (CO1, K4)

12. (a) Discuss the causes, clinical condition and diagnosis of hypoglycaemia. (CO1, K3)

Or

(b) Write briefly about the inborn errors of carbohydrate metabolism. (CO2, K3)

13. (a) Describe the types, causes and diagnostic approach for Anemia. (CO3, K3)

Or

(b) Write briefly about X-linked recessive genetic disorder. (CO3, K4)

14. (a) Describe the types, causes and diagnostic approach of disorder of plasma protein. (CO3, K3)

Or

(b) Write briefly about gout disorder. (CO3, K3)

15. (a) Give an account of Type I hypersensitivity. (CO5, K2)

Or

(b) Describe the biosynthesis of purine and pyrimidine nucleotides. (CO4, K2)

## Part C (5 × 8 = 40)

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

16. (a) Discuss the pathophysiology and clinical manifestation of psoriasis. (CO5, K3)

Or

(b) Write in detail about the impact of carbohydrate metabolism in urine, blood and kidney. (CO1, K3)

17. (a) Discuss the pathophysiology, clinical manifestation and diagnostic approaches of inborn errors of lipid metabolism. (CO2, K4)

Or

(b) Write in detail about the mineral metabolism disorder with reference to cushings syndrome. (CO3, K4)

18. (a) Discuss the pathophysiology, clinical manifestation and diagnostic approaches of inborn errors of amino acid metabolism. (CO3, K5)

Or

(b) Describe the metabolic pathway linked to cholesterol metabolism. (CO2, K5)

19. (a) Explain in detail about the pathophysiology and diagnostic approach of Lesch-Nhyan syndrome. (CO4, K4)

Or

(b) Discuss the pathophysiology and management of Xanthinuria. (CO4, K3)

20. (a) Write in detail about the Multiple sclerosis. (CO5, K3)

Or

(b) Describe the immunology of type IV hypersensitivity reaction. (CO5, K2)

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**R1956**

**Sub. Code**
**24MBM1C3**

**M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024**

**First Semester**

**Biomedical Science**

**CLINICAL PATHOLOGY**

**(CBCS – 2024 onwards)**

Time : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

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

1. Which of the following infection is commonly associated with extraintestinal strains of *E. coli?* (CO1, K1)

   (a) Community acquired pneumonia

   (b) Community acquired urinary tract infection

   (c) Hemorrhagic diarrhea

   (d) Traveler's diarrhea

2. What is the characteristic appearance of the diarrhea in cholera? (CO1, K1)

   (a) Bloody and foul-smelling

   (b) Colorless and odorless, resembling "rice water"

   (c) Green and frothy

   (d) Yellow and oily

3. Which of the following is NOT a disease caused by a poxvirus? (CO2, K2)

(a) Monkeypox (b) Chickenpox

(c) Cowpox (d) Smallpox

4. Hepatitis B is transmitted through (CO2, K1)

(a) Sneezing (b) Coughing

(c) Blood transfusion (d) Mosquitoes

5. Which of these diseases results in meningitis caused by encapsulated yeast? (CO3, K1)

(a) Cryptococcosis (b) Histoplasmosis

(c) Candidiasis (d) Coccidiomycosis

6. What is the biological vector for African sleeping sickness? (CO3, K1)

(a) Mosquito (b) Tsetse fly

(c) Deer tick (d) Sand fly

7. How does anemia affect the body? (CO4, K4)

(a) The blood doesn't deliver enough oxygen to the body

(b) Blood becomes thin

(c) Tissues retain fluids

(d) None of the above

8. Hodgkin's lymphoma has ———————— stages (CO4, K4)

(a) 5 (b) 4

(c) 3 (d) 2

9. Insulin deficiency is associated with (CO5, K3)

(a) Reduced lipolysis

(b) Increased ketogenesis

(c) Reduced gluconeogenesis

(d) Reduced proteolysis

10. The most common type of testicular cancer is (CO5, K3)

(a) Germ cell tumor (b) Leydig cell tumor

(c) Sertoli cell tumor (d) None of the above

**Part B** (5 × 5 = 25)

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

11. (a) Give an account on the laboratory diagnosis of *E. coli* UTI. (CO1, K3)

Or

(b) Explain the risk factors associated with syphilis infection. (CO1, K3)

12. (a) Explain the importance of viral vaccines. (C02, K3)

Or

(b) Write briefly about the laboratory diagnosis of Hepatitis B virus infection. (CO2, K3)

13. (a) Explain the various methods of fungi detection in clinical samples. (CO3, K5)

Or

(b) Write briefly about the stool concentration method for the detection of ova and cyst. (CO3, K3)

14. (a) Give an account on non-hodgkins lymphoma. (CO4, K3)

Or

(b) Write briefly about platelet deficiency disorder. (CO4, K3)

15. (a) Explain the risk factors associated with Diabetes mellitus. (CO5, K4)

Or

(b) Write briefly about the tuberculous meningitis. (CO4, K5)

## Part C (5 × 8 = 40)

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

16. (a) Describe the pathogenesis and laboratory diagnosis of enteric fever. (CO1, K5)

Or

(b) Write in detail about the pathogenesis and prophylaxis of tetanus. (CO1, K5)

17. (a) Classify the oncogenic viral infection. Explain in detail about the HPV replication. (CO2, K5)

Or

(b) Describe the replication and laboratory diagnosis of HIV infection. (CO2, K5)

18. (a) Explain in detail about the lifecycle of Plasmodium falciparum. (CO3, K5)

Or

(b) Describe the pathogenesis and laboratory diagnosis of Candidiasis. (CO3, K5)

19. (a) Explain in detail about the types and pathophysiology of anaemia. (CO4, K5)

Or

(b) Describe the pathophysiology of liver cirrhosis. (CO4, K5)

20. (a) Write in detail about the pathophysiology of pituitary tumor. (CO5, K5)

Or

(b) Describe the different phases of Menstrual cycle. (CO5, K5)

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**R1957**

**Sub. Code**
**24MBM1E1**

**M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024**

**First Semester**

**Biomedical Science**

**Elective : COMPUTATIONAL BIOLOGY**

**(CBCS – 2024 onwards)**

Time : 3 Hours Maximum : 75 Marks

**Part A** ($10 \times 1 = 10$)

Answer **all** the questions by choosing the correct answer.

1. What is the primary function of a server in a computer network? (CO1, K4)

   (a) Data storage

   (b) Network connectivity

   (c) Processing power

   (d) User interface

2. What is PubMed primarily used for biological research? (CO1, K4)

   (a) Storing genome sequences

   (b) Publishing experimental data

   (c) Finding scientific articles

   (d) Visualizing protein structures

3. What is the application of pairwise sequence alignment? (CO2, K4)

(a) To identify similar sequences

(b) To determine protein structure

(c) To predict gene function

(d) To analyze genomic data

4. Which database is used for protein sequence queries? (CO2, K4)

(a) GenBank

(b) Swiss-Prot

(c) Protein Data Bank

(d) PubMed

5. Which of the following is a key application of genome sequencing? (CO3, K2)

(a) Protein structure prediction

(b) Drug discovery

(c) Phylogenetic analysis

(d) Disease diagnosis

6. What is the primary goal of genome assembly? (CO3, K2)

(a) To identify genes

(b) To determine protein structure

(c) To analyze genomic data

(d) To reconstruct the original genome sequence

7. Which method is commonly used for predicting secondary structure in proteins? (CO4, K5)

(a) X-ray crystallography

(b) NMR spectroscopy

(c) Cryo-EM

(d) BLAST

8. Which method is used for protein modeling? (CO4, K5)

(a) Homology modeling

(b) Ab initio modeling

(c) Molecular dynamics

(d) Energy minimization

9. Which tool is commonly used for molecular docking in drug discovery? (CO5, K5)

(a) Rasmol

(b) Pymol

(c) Auto Dock

(d) GenBank

10. Lipinski's rule of five is used for (CO5, K5)

(a) Docking

(b) Similarity search

(c) Dynamics simulation

(d) Drug likeness

## Part B (5 × 5 = 25)

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

11. (a) Discuss the importance of Unix and Linux operating systems in computational biology. (CO1, K4)

Or

(b) Explain the role of biological databases in modern research with neat sketch. (CO1, K4)

12. (a) Discuss the significance of MSA in evolutionary biology and make a note on profiles and motifs in understanding sequence conservation. (CO2, K4)

Or

(b) Compare and contrast the BLAST and FASTA tools in sequence analysis. (CO2, K4)

13. (a) Explain the process of genome sequencing and the challenges associated with sequence assembly. (CO3, K2)

Or

(b) Discuss the role of proteomics in understanding biochemical pathways. (CO3, K2)

14. (a) Explain the process of protein modeling from its sequence and potential applications in drug discovery. (CO4, K5)

Or

(b) Write a short note on Ramachandran plot analysis and its application. (CO4, K5)

15. (a) Describe the applications of molecular visualization tools and their significance in analyzing protein conformation and function. (CO5, K5)

Or

(b) Discuss the process of ligand designing and optimization in drug discovery. (CO5, K5)

**Part C** $(5 \times 8 = 40)$

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

16. (a) Describe the computational approaches to biological research and the role of computers in bioinformatics. (CO1, K4)

Or

(b) Discuss the applications of biological databases for sequence analysis. (CO2, K4)

17. (a) Illustrate the process of finding and utilizing scientific articles using search engines and public biological databases. (CO1, K4)

Or

(b) Explain the concept of protein modeling, including homology modeling and ab initio modeling and its applications. (CO4, K5)

18. (a) Explain the process of sequencing genomes, including sequence assembly and annotation and its importance in genomics. (CO3, K2)

Or

(b) Discuss in detail on molecular modeling in drug discovery, analog-based design and structure based design. (CO5, K5)

19. (a) With neat diagram explain the methods for predicting protein secondary structure prediction, and 3D structure prediction from its sequence. (CO4, K5)

Or

(b) Describe the use of biological databases, including Protein Data Bank, Swiss-Prot and GenBank, for sequence queries and analysis. (CO2, K4)

20. (a) Explain the process of molecular docking and its importance in drug discovery and development. (CO5, K5)

Or

(b) Detail the role proteomics and its significance in biological research. How do biochemical pathway databases support the study of proteomics? (CO3, K2)

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**R1958**

**Sub. Code**
**508301**

**M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024.**

**Third Semester**

**Biomedical Science**

**TOXICOLOGY**

**(CBCS – 2022 onwards)**

Time : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

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

1. Which of the following is a characteristic of acute toxicity? (CO1, K2)
   (a) Effects occur after prolonged exposure
   (b) It is always fatal
   (c) Symptoms appear rapidly after exposure
   (d) It involves cumulative effects over time

2. What is the primary function of the liver? (CO1, K2)
   (a) Absorption of nutrients
   (b) Metabolism of toxicants
   (c) Storage of toxins
   (d) Excretion of waste

3. Mycotoxins are primarily produced by which of the following? (CO2, K4)
   (a) Bacteria (b) Fungi
   (c) Animals (d) Plants

4. Which of the following is a common environmental toxicant associated with air pollution? (CO2, K4)

(a) Carbonmonoxide (b) Lead

(c) Aflatoxin (d) Mercury

5. Which of the following is an example of a physical carcinogen? (CO3, K4)

(a) Benzene (b) Asbestos

(c) Aflatoxin (d) Formaldehyde

6. Which of the following is a known genotoxic carcinogen? (CO3, K4)

(a) Ethanol (b) Asbestos

(c) Benzene (d) UV radiation

7. What is a common clinical sign of heavy metal poisoning? (CO4, K2)

(a) Hypertension (b) Skin rash

(c) Neuropathy (d) Respiratory distress

8. What is the primary treatment for opioid overdose? (CO4, K2)

(a) Naloxone (b) Flumazenil

(c) Activated charcoal (d) Atropine

9. Why repeat-dose toxicity studies are conducted? (CO5, K5)

(a) To evaluate the effectiveness of a drug

(b) To determine the acute toxicity of a substance

(c) To assess the long-term effects of a substance

(d) To identify the mechanism of action

10. What is the therapeutic window? (CO5, K5)

(a) The range of doses that produce therapeutic effects without toxicity

(b) The time frame in which a drug must be administered

(c) The maximum does that can be given without side effects

(d) The minimum effective dose of a drug

**Part B** ($5 \times 5 = 25$)

Answer **all** the question not more than 500 words each.

11. (a) Describe the types of toxicity and their measurement. Provide examples of substances that exhibit each type of toxicity. (CO1, K2)

Or

(b) Analyze the various routes of exposure to toxicants and their implications for absorption, distribution, and toxicity. Discuss how the route of exposure can influence the severity of toxic effects. (CO1, K2)

12. (a) Classify and describe the major categories of bio-toxins including mycotoxins, bacterial toxins and animal toxins. Discuss their sources, mechanisms of action and health effects. (CO2, K4)

Or

(b) Analyze the biochemical mechanisms of toxicity related to altered calcium homeostasis and covalent binding to cellular macromolecules. Provide examples of toxicants that act through these mechanisms. (CO2, K4)

13. (a) Describe the multistage process of carcinogenesis, including initiation. promotion and progression Discuss the role of genetic and epigenetic factors in this process. (CO3, K4)

Or

(b) Discuss the concept of mutagenesis types of mutations and the effects of mutagenic agents- Explain the relationship between mutagenesis and carcinogenesis. (CO3, K4)

14. (a) Discuss the clinical symptoms and management of poisoning from heavy metals, insecticides and opioids. Provide specific examples and treatment protocols for each category. (CO4, K2)

Or

(b) Analyze the role of biomarkers in the assessment of toxicity. Discuss the criteria for selecting appropriate biomarkers and the limitations of current approaches in toxicity evaluation. (CO4, K2)

15. (a) Explain the concept of median effective dose (ED50), median toxic does (TD50) and median lethal dose (LD50). Discuss their significance in toxicology and risk assessment. (CO5, K5)

Or

(b) Describe the various short-term tests for mutagenicity and genetic toxicity and their applications in toxicity testing. (CO5, K5)

## Part C (5 × 8 = 40)

Answer **all** the question not more than 1000 words each.

16. (a) Explain the mechanisms of action of toxicants at the cellular level, focusing on how they disturb excitable membrane function. Discuss the factors influencing the toxic effects of these substances. (CO1, K2)

Or

(b) Describe the concept of ecotoxicology and its importance in understanding the impact of environmental toxicants on ecosystems. Provide examples of how pollutants can affect aquatic life. (CO2, K4)

17. (a) Explain the biochemical basis of toxicity. focusing on the mechanisms of disturbance of excitable membrane function mid altered calcium homeostasis. Discuss how these mechanisms contribute to the toxic effects observed in various organ systems. (CO2, K4)

Or

(b) Evaluate the processes absorption, distribution, metabolism and excretion (ADME) of toxicants in the body. Discuss the factory that influence each of these processes and their implications for toxicity. (CO1, K2)

18. (a) Explain the concepts of chromosomal alterations. DNA damage, teratogenicity and mutagenicity. Discuss how these factors contribute to the development of cancer and the significance of studying them in toxicology. (CO3, K4)

Or

(b) Describe the incidence of acute poisoning and the preventive measures that can be implemented to reduce its occurrence. (CO4, K2)

19. (a) Examine the role of the immune system in response to poisoning. Discuss how different poisons can trigger immune responses and the implications for treatment and management of poisoned patients. (CO4, K2)

Or

(b) Discuss the mechanisms of action of chemical carcinogens- highlighting the differences between genotoxic and non-genotoxic carcinogens. (CO3, K4)

20. (a) Evaluate the importance of dose-response relationships in toxicology. Discuss how median effective dose (ED50), median toxic dose (TD50). and median lethal dose (LD50) are determined from dose-response curves. Explain the significance of these metrics in assessing the safety and efficacy of drugs. (CO5, K5)

Or

(b) Explain the difference between short-term and long-term toxicity studies. What are the objectives of each type of study? (CO5, K5)

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**R1959**

**Sub. Code**
**508302**

**M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024**

**Third Semester**

**Biomedical Sciences**

**MEDICAL ONCOLOGY**

**(CBCS – 2022 onwards)**

Time : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

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

1. Malignant tumours of connective tissues are called as (CO2, K1)

   (a) Carcinomas (b) Sarcomas

   (c) Anaplasia (d) Neoplasia

2. Programmed cell death is called as (CO1, K1)

   (a) Necrosis (b) Metastasis

   (c) Apoptosis (d) Infarction

3. Wart are caused by (CO1, K1)

   (a) Human papilloma virus

   (b) Epstein Barr virus

   (c) Rhinovirus

   (d) Herpes virus

4. Repeated sun damage to skin is often followed by thickening and crustiness of the surface layers of the skin called (CO2, K1)

   (a) Acanthosis (b) Barret's ulcer

   (c) Hyperkeratosis (d) Virtiligo

5. Most useful and specific screening test for early detection of cancer of cervix of the uterus is (CO4, K1)

(a) Mamogram

(b) PSA screening test

(c) PCR

(d) Pap" (Papanicolaou) smear test

6. A form of radiotherapy in which radio-active needles or "seeds" are inserted into a tumour to give a measured dose of irradiation directly to the cancer is (CO5, K1)

(a) Brachytherapy (b) Chemotherapy

(c) Acupuncture (d) Telangiectasia

7. Example of anti-Estrogen agent is (CO5, K1)

(a) Tamoxifen (b) Cortisone

(c) Interferons (d) Levastrol

8. The technique of destroying tumour tissue by using an extremely cold temperature application to freeze-thaw and so destroy the tissue is (CO5, K1)

(a) Photodynamic therapy

(b) Laser surgery

(c) Cryodynamic therapy

(d) Cryosurgery

9. Basal cell carcinoma, Squamous cell carcinoma and melanoma are examples of (CO4, K1)

(a) Skin cancer (b) Lung cancer

(c) Prostate cancer (d) Stomach cancer

10. The microbe likely to cause gastric adenocarcinoma is (CO2, K1)

(a) Schistosomiasis haematobium

(b) Helicobacter pylon

(c) Human papillomavirus

(d) Hepatitis B

## Part B (5 × 5 = 25)

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

11. (a) Discuss the role of angiogenesis inhibitors in the treatment of cancer. (CO1, K2)

Or

(b) What are morphogens? Discuss their role in the development of cancer. (CO1, K3)

12. (a) What is metastasis and write in detail about its stages? (CO2, K3)

Or

(b) What is chromosomal translocation? Discuss about the different types of chromosomal translocations. (CO2, K4)

13. (a) Write short note on the cell cycle in cancer. (CO3, K4)

Or

(b) Define necrosis. Describe avascular necrosis with example. (CO3, K4)

14. (a) Write in detail about the types of biopsies used in the detection of cancer. (CO4, K4)

Or

(b) Explain how physical examination helps in the detection of cancer. (CO4, K3)

15. (a) What is the goal of cancer treatment and write briefly about the local and the systemic cancer treatments? (CO5, K3)

Or

(b) Write a note on cancer vaccines. (CO5, K4)

## Part C (5 × 8 = 40)

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

16. (a) What is angiogenesis? Discuss why angiogenesis in important in cancer. (CO1, K5)

Or

(b) What are cell adhesion molecules? Explain their in cancer metastasis, Angiogenesis and progression of cancer. (CO1, K5)

17. (a) Define tumour. Mention its types and write in detail about the WHO classification of tumour. (CO2, K4)

Or

(b) What are oncogenes? Explain their role of oncogene products in altering the cell growth. (CO2, K4)

18. (a) Explain in detail about the cancer genes and their mutations. (CO3, K5)

Or

(b) Describe the constituent cell types present in the microenvironment. (CO3, K5)

19. (a) Explain the role of imaging techniques in the diagnosis of cancer. (CO4, K5)

Or

(b) Write in detail about the anticancer agents delivery system. (CO4, K4)

20. (a) Explain the usage of radiation in the treatment of cancer and add a note on the toxicity of radiation therapy. (CO5, K5)

Or

(b) Write in detail about the targeted chemotherapy and write briefly its mechanism of action. (CO5, K5)

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**R1960**

**Sub. Code**
**508505**

**M.Sc. DEGREE EXAMINATION, NOVEMBER – 2024**

**Third Semester**

**Biomedical Science**

**Elective — BIOMATERIALS AND TISSUE ENGINEERING**

**(CBCS – 2022 onwards)**

Time : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

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

1. Which of the following is a disadvantage of polymeric biomaterials? (CO1, K2)

   (a) Easy processability

   (b) Chemical stability

   (c) Prone to wear and breakdown

   (d) Low cost

2. Which of the following is a common method to assess implant-tissue interaction? (CO1, K2)

   (a) X-Tay diffraction

   (b) Scanning electron microscopy

   (c) Histological analysis

   (d) Tensile testing

3. Which of the following is an undesirable reaction of the body to an implanted material? (CO2, K4)

(a) Bone ingrowth

(b) Corrosion

(c) Tissue regeneration

(d) Angiogenesis

4. Which of the following is a strategy to improve the osseointegration of implants? (CO2, K4)

(a) Increasing surface roughness

(b) Decreasing surface energy

(c) Reducing porosity

(d) Increasing stress shielding

5. What is the most common reason for cartilage implant failure? (CO3, K4)

(a) Poor integration with host tissue

(b) Infection at the implantation site

(c) Excessive mechanical loading

(d) Inadequate vascularization

6. Wear debris from implants primarily affects which of the following biological processes? (CO3, K4)

(a) Bone remodeling

(b) Angiogenesis

(c) Osteogenesis

(d) Hemostasis

7. What is the primary consequence of protein adsorption on the surface of implanted materials? (CO4, K2)

(a) Increased mechanical strength

(b) Enhanced biocompatibility

(c) Initiation of the foreign-body response

(d) Decreased cellular migration

8. Which of the following factors can influence the adhesion of proteins to biomaterial surfaces? (CO4, K2)

(a) surface roughness

(b) temperature

(c) pH of the surrounding environment

(d) all of the above

9. Which type of polymer is commonly used in tissue engineering due to its biodegradability and biocompatibility? (CO5, K5)

(a) Polyethylene

(b) Polylactic acid (PLA)

(c) Polyvinyl Chloride (PVC)

(d) Polypropylene

10. In the context of tissue homeostasis, what is the primary function of tissue stem cells? (CO5, K5)

(a) To generate new tissues only during injury

(b) To maintain and repair tissues throughout life

(c) To differentiate into immune cells

(d) To produce hormones

## Part B (5 × 5 = 25)

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

11. (a) Briefly explain the advantages and disadvantages of polymeric biomaterials. (CO1, K2)

Or

(b) Describe the desirable biological response of bone tissue to implanted bioactive ceramics like hydroxyapatite and calcium phosphates. (CO2, K4)

12. (a) Explain the concept of stress shielding and its implications as a mode of failure for orthopedic implants. (CO2, K4)

Or

(b) What are the key properties that make hydroxyapatite a suitable coating material for implants? (CO1, K2)

13. (a) Compare and contrast the materials used for cartilage and vascular implants, highlighting their unique properties. (CO3, K4)

Or

(b) Discuss the influence of surface properties, such as wettability and charge, on the conformation and bioactivity of adsorbed proteins. (CO4, K2)

14. (a) Discuss the factors contributing to bladder implant failure and their prevention strategies. (CO3, K4)

Or

(b) Identify and explain two types of natural polymers used in tissue engineering and their specific applications. (CO5, K5)

15. (a) Discuss the significance of the extracellular matrix (ECM) in tissue engineering applications. (CO5, K5)

Or

(b) Describe the process of cellular migration on implanted materials and its significance in tissue regeneration. (CO4, K2)

**Part C** ($5 \times 8 = 40$)

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

16. (a) Compare and contrast the properties, advantages and disadvantages of metallic, ceramic, and polymeric biomaterials, Provide specific examples of their applications in the biomedical field. (CO1, K2)

Or

(b) Discuss the various materials used for dental implants including titanium, zirconia, and ceramics. Compare their mechanical properties, biocompatibility and clinical outcomes and explain how these factors influence the choice of material for specific patient scenarios. (CO3, K4)

17. (a) Describe the desirable and undesirable biological responses of the body to implanted materials. Explain how the surface properties of nanomaterials can be engineered to promote favorable interactions with bone tissue and minimize adverse reactions like inflammation or foreign body response. (CO2, K4)

Or

(b) Discuss the importance of surface properties in determining the success of an implant. Describe various surface modification techniques used to enhance the biocompatibility and osseointegration of implants. (CO1, K2)

18. (a) Evaluate the potential modes of failure associated with orthopedic implants, such as wear debris generation, aseptic loosening and mechanical failure. Explain how nanotechnology-based solutions, such as improved wear resistance and enhanced osseointegration, can mitigate these failure modes and improve the longevity of implant. (CO2, K4)

Or

(b) Extracellular matrix (ECM) deposition is a hallmark of successful tissue integration of implanted materials. Describe the composition and organization of the ECM and its role in supporting cellular functions. Discuss the strategies used to promote ECM deposition, such as the incorporation of ECM-derived proteins or peptides into the material surface or the use of ECM-mimetic scaffolds. (CO4, K2)

19. (a) What factors affect protein adsorption on implanted materials and how can the structure and activity of these proteins be adjusted to encourage cellular responses like adhesion, migration, and differentiation? (CO4, K2)

Or

(b) Evaluate the challenges and strategies associated with using degradable polymers in tissue engineering. Discuss how the degradation rate of these polymers can be controlled and the implications for tissue regeneration. (CO5, K5)

20. (a) Explain the concept of bioactive scaffolds in tissue engineering. Discuss how bioactive materials can enhance cell adhesion, proliferation, and differentiation, and provide examples of bioactive scaffolds used in clinical applications. (CO5, K5)

Or

(b) Examine the materials used in vascular implants and the challenges associated with their use. Discuss the modes of failure for vascular implants, including thrombosis and infection, and the strategies to mitigate these risks to improve patient outcomes. (CO3, K4)

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