R2791

Sub. Code
24MBM2C1

M.Sc. DEGREE EXAMINATION, APRIL – 2025.

Second Semester

Biomedical Science

MEDICAL AND APPLIED GENETICS

(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 numerical chromosomal aberration is associated with Down syndrome? (CO1, K2)

   (a) Monsomy X (b) Trisomy 13

   (c) Trisomy 21 (d) Trisomy 18

2. Which technique is best suited to detect a submicroscopic deletion in a patient suspected of having DiGeorge syndrome? (CO2, K2)

   (a) G-banding karyotype

   (b) Fluorescence In Situ Hybridization (FISH)

   (c) Western blot

   (d) Polymerase Chain Reaction (PCR)

3. Albinism is caused by a defect in th metabolism of : (CO1, K4)

   (a) Tyrosine (b) Methionine

   (c) Leucine (d) Glutamine

4. Which inborn error of metabolism is caused by a deficiency of Homogentisate 1,2 dioxygenase? (CO1, K4)

(a) Phenylketonuria

(b) Alkaptonuria

(c) Maple syrup urine disease

(d) Tyrosinemia type I

5. Which of the following is NOT an inherited immunodeficiency disorder (CO2, K4)

(a) X-linked agammaglobulinemia

(b) SCID (Severe Combined Immunodeficiency)

(c) Crohn's disease

(d) Hyper-IgM syndrome

6. Which of the following statements about genetic susceptibility to Type 1 diabetes is TRUE? (CO3, K4)

(a) It follows a strict autosomal dominant inheritance pattern

(b) It is caused by mutations in a single gene

(c) The HLA-DR3 and HLA-DR4 alleles increase susceptibility

(d) It is only influenced by genetic factor, with no environmental contribution.

7. Thalassemia is caused by mutations in which gene? (CO1, K2)

(a) HBA and HBB (b) CFTR

(c) FGFR3 (d) COL1A1

8. Which mutation type is most commonly responsible for sickle cell anemia? (CO2, K2)

(a) Nonsense mutation in the HBB gene

(b) Missense mutation in the HBB gene

(c) Frameshift mutation in the HBA 1 gene

(d) Large deletion in the beta-globin locus

9. If a new mutation occurs in a germ cell of an unaffected parent, leading to an autosomal dominant disorder in their child, this is an example of : (CO3, K5)

(a) Penetrance (b) Anticipation

(c) De novo mutation (d) Genetic drift

10. A couple has a child with an autosomal recessive disorder, but neither parent is affected. What is the probability that their next child will also have the disorder? (CO3, K5)

(a) 0% (b) 25%

(c) 50% (d) 75%

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

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

11. (a) Describe the different types of chromosomal banding techniques and their applications in cytogenetics. (CO1, K2)

Or

(b) What are the structural and numerical chromosomal aberrations? Explain their significance in genetic disorders. (CO2, K2)

12. (a) Explain the any two inborn errors of carbohydrate metabolism. (CO2, K4)

Or

(b) What is the significance of animal models in Pharmacogenomics research? (CO1, K4)

13. (a) Describe the genetic basis of Type 1 and Type 2 diabetes. (CO1, K4)

Or

(b) Explain the genetic and environmental factors contributing to coronary artery disease. (CO2, K4)

14. (a) Discuss the genetic and molecular pathology of Huntington's disease. (CO1, K2)

Or

(b) Elaborate the role of mitochondrial genetics in human diseases. (CO2, K2)

15. (a) Summarize Mendal's principles of inheritance and their applications in human genetics. (CO2, K5)

Or

(b) Explain the role of molecular genetic data in pedigrees. (CO3, K5)

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

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

16. (a) Discuss the role of numerical and structural chromosomal aberrations in cancer development. (CO1, K2)

Or

(b) Explain the molecular cytogenetic techniques FISH and CGH. How do they help in detecting chromosomal abnormalities? (CO2, K2)

17. (a) Discuss the genetic basis of mucopolysaccharidoses and their impact on metabolism. (CO2, K4)

Or

(b) Explain the disorders of amino acid metabolism and their clinical manifestations. (CO3, K4)

18. (a) Explain the role of genetic and environmental factors in the development of coronary artery disease. (CO2, K4)

Or

(b) How do Genome-Wide Association Studies (GWAS) help in understanding complex genetic disorders? (CO3, K4)

19. (a) Describe the different types of hemoglobinopathies and their clinical significance. (CO1, K2)

Or

(b) Discuss the genetic and molecular basis of inherited cardiomyopathies and arrhythmias. (CO2, K2)

20. (a) Compare and contrast X-linked dominant, X-linked recessive, and Y-linked inheritance patterns using pedigree examples. (CO2, K5)

Or

(b) Discuss the challenges and limitations of pedigree analysis in modern genetic studies. (CO1, K5)

R2792

Sub. Code
24MBM2C2

M.Sc. DEGREE EXAMINATION, APRIL – 2025

Second Semester

Biomedical Science

PHARMACOLOGY

(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 factors does NOT influence drug absorption? (CO3, K2)
   (a) Lipid solubility
   (b) Molecular weight
   (c) Half–life of the drug
   (d) pH of gastrointestinal tract

2. Biotransformation of drugs primarily occurs in which organ? (CO2, K2)
   (a) Kidney (b) Liver
   (c) Lungs (d) Pancreas

3. Which of the following best describes the action of NSAIDs? (CO1, K4)
   (a) They selectively block serotonin reuptake
   (b) They inhibit cyclooxygenase enzymes
   (c) They increase prostaglandin synthesis
   (d) They function as opioid receptor agonists

4. Which of the following is NOT an effect of adrenergic beta-blockers? (CO3, K4)

(a) Decreased heart rate

(b) Bronchodilation

(c) Reduced blood pressure

(d) Decreased cardiac output

5. Which of the following is a key limitation of transgenic animal models in drug discovery? (CO1, K4)

(a) High specificity to human diseases

(b) Ethical concerns and high costs

(c) Rapid testing procedures

(d) Lack of genetic similarity to humans

6. Which phase of clinical trials focuses on safety and dose determination in healthy volunteers? (CO2, K4)

(a) Phase I

(b) Phase II

(c) Phase III

(d) Phase IV

7. The CPCSEA guidelines regulate which aspect of animal research in India? (CO1, K2)

(a) Drug formulation

(b) Genetic modification of humans

(c) Animal breeding and ethics

(d) Drug pricing

8. Which of the following is a major limitation of animal testing in drug research? (CO1, K2)

(a) High correlation with human trials

(b) Ethical concerns and species differences

(c) Ease of reproducibility

(d) Lack of regulatory oversight

9. Which of the following is a key objective of pharmaco vigilance? (CO2, K5)

(a) Increasing drug sales through better marketing

(b) Ensuring the effectiveness of new drug formulations

(c) Detecting, assessing, and preventing adverse drug reactions

(d) Conducting clinical trials for new drug candidates

10. Which of the following pharmaco vigilance methods relies on voluntary reporting of adverse drug reactions? (CO1, K5)

(a) Cohort studies

(b) Spontaneous reporting system

(c) Meta-analysis

(d) Randomized controlled trials

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

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

11. (a) Explain the different routes of drug administration with suitable examples. (CO1, K2)

Or

(b) Describe the process of drug absorption and the factors influencing it. (CO2, K2)

12. (a) Differentiate between cholinergic and anticholinergic drugs with examples. (CO1, K4)

Or

(b) Explain the mechanism of action, clinical uses, and adverse effects of adrenergic blockers. (CO3, K4)

13. (a) What are in vitro and in vivo drug screening methods? Discuss their importance. (CO1, K4)

Or

(b) Discuss the role of transgenic animal models in drug discovery and their ethical concerns. (CO3, K4)

14. (a) Discuss the role and functions of the Institutional Animal Ethics Committee (IAEC). (CO1, K2)

Or

(b) Discuss the different methods used for restraining and anesthetizing laboratory animals. (CO2, K2)

15. (a) What is MedDRA? Discuss its role in pharmaco vigilance data classification. (CO2, K5)

Or

(b) Discuss the various methods of detecting adverse drug reactions (ADRs) and their significance. (CO1, K5)

Part C (5 × 8 = 40)

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

16. (a) Describe the pharmacokinetic processes (ADME) in detail, including examples and clinical significance. (CO1, K2)

Or

(b) Elaborate on the factors affecting drug distribution, with emphasis on protein binding and tissue permeability (CO1, K2)

17. (a) Describe the mechanism of action and therapeutic uses of NSAIDs. (CO2, K4)

Or

(b) Discuss the pharmacology of anticoagulants, their classification, mechanism of action, and therapeutic applications. (CO3, K4)

18. (a) Discuss in silico drug discovery techniques, including molecular docking and structure-based drug design. (CO2, K4)

Or

(b) Outline the steps involved in the early drug discovery process. (CO1, K4)

19. (a) Discuss the impact of the Narcotic Drugs and Psychotropic Substances Act, 1985, on drug regulation in India. (CO1, K2)

Or

(b) Discuss the regulatory framework governing the import, manufacture, and sale of pharmaceuticals in India. (CO2, K2)

20. (a) Discuss the role of data analytics in pharmaco vigilance, including signal detection techniques. (CO3, K5)

Or

(b) Elaborate in detail on personalized medicine and its relationship with pharmacogenomics in drug safety. (CO1, K5)

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R2793

Sub. Code
24MBM2E1

M.Sc. DEGREE EXAMINATION, APRIL – 2025

Second Semester

Biomedical Science

Elective: FORENSIC SCIENCE

(CBCS – 2024 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

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

1. Who is discover DNA finger printing? (CO4, K2)
   (a) Alee Jeffreys
   (b) Boliner and Rodriguez
   (c) Thomas Hunt Morgan
   (d) George Gamow

2. Which of the following is a hepatotoxic poison? (CO4, K2)
   (a) Alcohol (b) Atropin
   (c) Morphin (d) Ampetamine

3. Who is considered as Father of forensic toxicology? (CO2, K4)
   (a) Mathew Orfila (b) Alfec Jeffreys
   (c) Alfred stuvevant (d) Mendel

4. Cherry red discolordation of blood is due to (CO2, K4)
   (a) H2S (b) CH4
   (c) CO (d) CCl4

5. Rigor mortis occurs due to depletion of (CO3, K4)

(a) ATP (b) Ca2+

(c) Lactate (d) O2

6. The first requirement in any investigation of a poisoning case is to establish (CO2, K4)

(a) Vis-a-vis (b) Corpus delicti

(c) Corpus leuteum (d) Vis-a-fornte

7. The following autopsy materials will be used for detection of poison and toxicological examination for gaseous poisoning except (CO4, K2)

(a) Brain (b) Heart

(c) Lungs (d) Muscle

8. The following features are important indicators for forensic ballistics except (CO2, K4)

(a) muzzle patterns (b) scorching

(c) powder residues (d) contact marks

9. Adipocere means (CO3, K4)

(a) Corpse wax

(b) Stiffening of muscles after death

(c) Corpse protein

(d) Dehydration of the cadaveric tissue

10. The tools and techniques of forensic science are oriented to meet the following in an analysis (CO1, K2)

(a) Sensitivity (b) Flexibility

(c) Rapidity (d) Specificity

Part B (5 × 5 = 25)

Answer **all** the questions note more than 500 words each.

11. (a) Write a note on classification of forensic toxicology. (CO1, K2)

Or

(b) Write about the concept of Forensic Science and its significance. (CO1, K2)

12. (a) Mention the steps to document scene of occurrence. (CO2, K4)

Or

(b) Discuss the duties of forensic scientist. (CO3, K4)

13. (a) Write Salient points on Rigor Mortis. (CO3, K4)

Or

(b) Write a note on Putrefaction and Mummification. (CO3, K4)

14. (a) Discuss on basic identification of unknown person. (CO4, K2)

Or

(b) How Polygraph is used in Forensic Investigations. (CO4, K2)

15. (a) Write a note on Postmortem artifacts. (CO3, K4)

Or

(b) Mention the Salient features of DNA finger printing. (CO4, K2)

Part C (5 × 8 = 40)

Answer **all** the questions note more than 1000 words each.

16. (a) Write in Detail about the various Forensic Science Laboratory Institution in India. (CO1, K2)

Or

(b) Discuss in Detail about the Common Techniques used in Forensic Investigation Purpose. (CO1, K2)

17. (a) Discuss the Classification of Poisons and Write about Inorganic and Organic Poison their mode of Action. (CO2, K4)

Or

(b) Mention the basics five Types of Medicolegal Causes. How to Write a MLC report. (CO2, K4)

18. (a) Discuss the early and immediate changes after Death. (CO3, K4)

Or

(b) Describe in Detail about Adipocere and Maceration. (CO4, K2)

19. (a) Explain BEOSP. (CO4, K2)

Or

(b) Write Detailed note on classification of Cyber Crime. (CO4, K2)

20. (a) What are the three Division of Forensic Ballistics and Write about each Division? (CO2, K4)

Or

(b) Discuss the commonly used Body Fluids in Forensic Investigation. (CO2, K4)

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R2794

Sub. Code
24MBM2E2

M.Sc. DEGREE EXAMINATION, APRIL – 2025.

Second Semester

Biomedical Science

Elective : ARTIFICIAL ORGANS

(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 Artificial Organ has been mechanically reproduced in a Compact Form? (CO3, K4)

   (a) Heart (b) Lungs

   (c) Kidney (d) Liver

2. What is the basic principle in the Concept of Artificial Kidney? (CO3, K4)

   (a) Bulkflow (b) Diffusion

   (c) Osmosis (d) Active Transport

3. ECMO stands for (CO3, K4)

   (a) Extra Capillary Membrane Oxygenation

   (b) Extra Corporeal Muscular Oxygenation

   (c) Extra Capillary Muscular Oxygenation

   (d) Extra Corporeal Membrane Oxygenator

4. Thrombus Means (CO2, K4)

(a) A Blood Clot (b) A Moving Blood Clot

(c) Both (a) and (b) (d) Lipid Deposition

5. Indication of Values Prostheses (CO3, K4)

(a) Stenosis (b) Regurgitation

(c) Both (a) and (b) (d) Valvular Destruction

6. The Main Mode of CO_2 Transport in Blood is by (CO3, K4)

(a) Hydrogen ion (b) In Combination with Hb

(c) Bicarbonate ion (d) Plasma as Dissolved Form

7. The Indications for use of Intra Aortic Balloon Pump are the following except (CO2, K4)

(a) Unstable Angina

(b) Cardiogenic Shock

(c) Valvular Disorders

(d) Refractory Ventricular Failure

8. The Father of Artificial Organs is (CO1, K2)

(a) Willem J. Kolff (b) Willem Alden

(c) Willem Morgan (d) Willem Alfred

9. Which was the First Artificial Organ Made? (CO1, K2)

(a) Liver (b) Heart

(c) Kidney (d) Brain

10. The Key Piece of Equipment used in Peritoneal Dialysis is a (CO4, K2)

(a) Tenckhoff Catheters

(b) Central Venous Catheters

(c) Perma Caths

(d) Foley Catheter

Part B (5 × 5 = 25)

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

11. (a) Write a note on Evaluation of Artificial Organs. (CO1, K2)

Or

(b) Discuss on Various Factors that affect the outlook for Organ Replacement. (CO1, K2)

12. (a) Write a brief note on various Types of Circulatory Assist Devices. (CO2, K4)

Or

(b) Explain on Various Types of Valve Prostheses. (CO2, K4)

13. (a) Write a note on O_2 Hb Dissociation Curve with a help of a Diagram. (CO3, K4)

Or

(b) Mention any five basics Points for Comparison of Artificial Lungs and Natural Lungs. (CO3, K4)

14. (a) What is a Artificial Kidney Mention its types and Write on the basics Principle of Artificial Kidney. (CO2, K4)

Or

(b) What is Diabetes Mellitus and Write a note on the Insulin Therapy? (CO2, K4)

15. (a) Explain the Mechanism of Thrombus Deposition. (CO2, K4)

Or

(b) Write on the Design of Artificial Heart with the help of a Diagram. (CO2, K4)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1,000 words each.

16. (a) Elaborate on the Design of Artificial Organs. (CO1, K2)

Or

(b) Discuss on the recent advancements about the artificial organs. (CO1, K2)

17. (a) Describe Percutaneous Cardio Pulmonary bypass in detail. (CO2, K4)

Or

(b) Elaborate on the history of artificial heart. (CO2, K4)

18. (a) Define ECMO? What is the basic principle of ECMO and mention its Types. Add a note on Challenges faced during use of ECMO. (CO3, K4)

Or

(b) Explain artificial lung ventilation. (CO3, K4)

19. (a) Discuss in the detail about therapeutic options in diabetes and insulin administration system. (CO4, K2)

Or

(b) Elaborate on Renal Transplantation. (CO4, K2)

20. (a) Elaborate on various types of dialysis. (CO4, K2)

Or

(b) Write in detail about insulin production system. (CO4, K2)

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