

**F-6372**

**Sub. Code**

**7MBC1C1**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**First Semester**

**Biochemistry**

**CHEMISTRY OF BIOMOLECULES**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Compare hypotonic and hypertonic solution.
2. Define free energy and free energy change.
3. What is an epimer? Give an example.
4. Define optical isomerism.
5. Mention the characteristics of a peptide bond.
6. What is meant by isoelectric point of a protein?
7. State two biological importance of glycolipids.
8. Define saponification value.
9. Mention the forces that stabilize the structure of nucleic acids.
10. What is hyperchromicity?

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Define buffers and discuss the biological applications of buffers.

Or

- (b) Give a brief account on non-covalent bonding.

12. (a) Discuss in brief about the structure and importance of monosaccharides.

Or

- (b) Give an account on marine polysaccharides.

13. (a) Give an account on 2° structure of proteins.

Or

- (b) Write a note on lipoproteins and glycoproteins.

14. (a) Describe the functions of phospholipids.

Or

- (b) Write a note on sphingomyelins.

15. (a) Describe the clover leaf structure of tRNA.

Or

- (b) Discuss the properties of DNA.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Derive Henderson-Hasselbach equation and state the biological importance of pH, pKa and pH indicators.

17. Elucidate the structure, occurrence and biological importance of glycogen and cellulose.
  18. Write short notes on
    - (a) chemical synthesis of polypeptides
    - (b) denaturation and renaturation of proteins.
  19. Give a detailed account on glycerophospholipids.
  20. Describe the structure and types of DNA.
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**F-6373**

**Sub. Code**

**7MBC1C2**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**First Semester**

**Biochemistry**

**ANALYTICAL BIOCHEMISTRY**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What is a cryoprotectant? Give examples.
2. Mention the uses of microtome.
3. State the principle of affinity Chromatography.
4. Mention any two applications of isoelectric focussing.
5. List any two application of mass spectrometry.
6. Differentiate Fluorescence and phosphorescence.
7. Write any two safety measures in handling radioisotopes.
8. What is autoradiography?
9. Write the principle of MALDI.
10. What is FPIA?

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) How will you determine the molecular weight by sedimentation velocity method?

Or

- (b) Write short notes on homogenization techniques.

12. (a) Explain the principle and technique of ion-exchange Chromatography.

Or

- (b) Give an account on southern blotting technique.

13. (a) Highlight the principle and applications of atomic absorption spectrophotometry.

Or

- (b) Enumerate the biological applications of photoacoustic spectroscopy.

14. (a) Give a brief account on scintillation counting.

Or

- (b) Comment on Radioimmuno assay.

15. (a) Write a note on atmospheric pressure ionization – electroscopy.

Or

- (b) How is X-ray fluorescence (XRF) used to determine the elemental composition of materials?

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Discuss in brief about density gradient centrifugation and add a note on its applications.
  17. Elaborate on the principle, technique and applications of HPLC.
  18. Explain the principle, components and applications of spectrophotometer.
  19. Give a detailed account on auto radiography and its applications.
  20. Summarize the steps involved in the sequencing of DNA.
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**F-6374**

**Sub. Code**

**7MBC1C3**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**First Semester**

**Biochemistry**

**Core Course III – ENZYME TECHNOLOGY**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What is  $V_{max}$ ?
2. What does the  $y$  and  $x$  intercept of the graph represent in the Line weaver—Burk plot.
3. EC.1 and EC.2 represent which type of enzyme?
4. What does it represent, if the turnover number of an enzyme is  $50,000 \text{ s}^{-1}$ ?
5. Name two industrial enzymes isolated from microbes.
6. What are extracellular enzymes?
7. Write a short note on the applications of immobilised cells.
8. How does the immobilization process affect the kinetic behaviour of Immobilised enzymes?
9. Define ribozymes.
10. What are biochips?

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Derive the Michaelis - Menten equation for unisubstrate reaction.

Or

- (b) Explain the significance of pH and temperature on enzyme activity.

12. (a) Write a short note on induced fit hypothesis.

Or

- (b) What are the different types of enzyme specificity?

13. (a) How are enzymes purified by gel filtration chromatography? Explain in detail.

Or

- (b) Explain the applications of plant cells as sources of enzymes.

14. (a) What are the applications of immobilized enzymes?

Or

- (b) What are the uses of enzymes in rDNA technology?

15. (a) What are the important criteria for selection of the ideal biosensors?

Or

- (b) What are artificial enzymes? Explain its applications.



**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Discuss in detail on competitive and non-competitive inhibition.
  17. Elaborate on multienzyme complex with an example
  18. Explain the different methods of enzyme precipitation.
  19. Elaborate in detail on matrix entrapment and affinity immobilisation.
  20. Discuss on how the multienzyme electrodes will enhance the performance of biosensors.
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**F-6375**

**Sub. Code**

**7MBC1C4**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**First Semester**

**Biochemistry**

**PLANT BIOCHEMISTRY**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define etioplast.
2. What is osmotic absorption?
3. List the importance of essential elements in plants.
4. What is GOGAT pathway?
5. Define quantasomes.
6. What is Warburg's effect?
7. What is bolting?
8. Why are storage proteins important?
9. What is pathogenesis in plant pathology?
10. How does pathogens attack plants?

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Outline the steps involved in the biosynthesis of plant cell wall.

Or

- (b) Give an account on the ascent of sap in plants.

12. (a) Enumerate the functions and deficiency symptoms of calcium and magnesium.

Or

- (b) Reveal the impact of pH on the nutrient availability to plants.

13. (a) Differentiate between C<sub>3</sub> and C<sub>4</sub> plants.

Or

- (b) Write short notes on photorespiration.

14. (a) Explain the chemical structure of abscissic acid.

Or

- (b) Enlist the economic importance of waxes or essential oils.

15. (a) Illustrate the initial stages of plant pathogenesis.

Or

- (b) Enumerate the pathological effects caused by pathogens during photosynthesis.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Describe the mechanism of translocation through phloem.
17. Elaborate the process of nitrogen fixation in nodules of leguminous plants.

18. Highlight the factors affecting the rate of photosynthesis.
  19. Elucidate the pathways in biosynthesis of indole-3-acetic acid from tryptophan.
  20. Explain the degree of specificity in plant pathogen interaction.
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**F-6376**

**Sub. Code**

**7MBC1E1**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**First Semester**

**Biochemistry**

**Elective — FOOD TECHNOLOGY**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define perishable foods.
2. Write the nutritive value of Ragi.
3. Mention the changes that occur during the freezing of food.
4. What are intermediate moisture foods?
5. Name any two moulds that spoil pulses.
6. Define souring.
7. What are the causes and symptoms of food poisoning?
8. Define botulism.
9. State role of microorganisms in cheese production.
10. What is meant by fermented meat?

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain in brief about the various conditions that influence microbial growth in food.

Or

- (b) Discuss the role of biotechnology in relation to the food industry.

12. (a) Write an account on canning and packing of foods.

Or

- (b) Describe the different methods of drying.

13. (a) Explain the microbial spoilage of nuts and oil seeds.

Or

- (b) Discuss in brief about the spoilage of vegetable and vegetable products.

14. (a) Give a brief note on mycotoxins and aflatoxins.

Or

- (b) Highlight the signs, symptoms and control measures of staphylococcal intoxication.

15. (a) Write a note on fermented milk.

Or

- (b) Discuss the basic principles of food fermentation.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Elaborate on the types and sources of microorganisms associated with food.

17. Discuss in detail about the control of microorganisms by chemicals, UV and ionizing radiations.
  18. Describe the microbial spoilage of fish.
  19. Explain in detail about salmonellosis and shigellosis.
  20. Outline the production process of beer.
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**F-6377**

**Sub. Code**

**7MBC2C3**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**Second Semester**

**Biochemistry**

**BIOTECHNOLOGY**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What is a phagemid?
2. What is a klenow fragment?
3. What is inverse PCR?
4. What is the role of glycerol and bromophenol blue in the gel loading buffer?
5. What type of mutation occurs in patients with cystic fibrosis?
6. What is the common cause for familial hypercholesterolemia?
7. What are MAbs?
8. What is an edible vaccine?



9. What is the need for sterilization in the fermentation process?
10. What is automated bioreactor sampling?

**Part B** (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Elaborate on the protocol for Blue- White screening.

Or

- (b) Write a detailed note on blunt end and cohesive end ligation.

12. (a) Write in detail on the methodology of Western blotting.

Or

- (b) Discuss on autoradiography and its applications.

13. (a) Explain the role of vectors in gene therapy.

Or

- (b) Explain the methods of gene therapy for tuberculosis.

14. (a) Discuss on the advantages and limitations of mAbs.

Or

- (b) What are catalytic antibodies? Give its applications.

15. (a) Differentiate between batch and continuous culture.

Or

- (b) Explain the industrial process involved in the production of vitamins.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Write a detailed note on YAC cloning system.
  17. Explain the methodology for asymmetric PCR.
  18. Discuss on the methods for molecular diagnosis of Sickle cell anemia.
  19. Explain the method for producing recombinant vaccines.
  20. Write a note on the applications of synthetic biology in Biotechnology Industry.
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**F-6378**

**Sub. Code**

**7MBC3C2**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**Third Semester**

**Biochemistry**

**MEDICAL BIOCHEMISTRY**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What is the clinical significance of high ALP?
2. How will you convert Deciliter to Milliliter?
3. What are the symptoms of Phenylketonuria?
4. What is proteinuria?
5. What is pentosuria?
6. What is ketosis?
7. What is the diagnostic significance of bilirubin?
8. What is the diagnostic significance of bile salts?
9. How is Crigler-Najjar syndrome diagnosed?
10. What is the significance of HbA1c test?

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the significance of LDH in health and disease.

Or

- (b) What are isozymes? Write a note on its diagnostic significance.

12. (a) Explain the significance of serum mycoproteins in disease condition.

Or

- (b) Write a note on Cysteine-Fanconi syndrome.

13. (a) Discuss on the significance of Glucose tolerance test.

Or

- (b) What are the causes and symptoms of hypercholesterolemia?

14. (a) Explain the importance of renal function test.

Or

- (b) Write a detailed note on the laboratory test for renal calculi and haemodialysis.

15. (a) Explain the significance with example on the applications of body fluids in clinical diagnosis.

Or

- (b) Elaborate on the clinical tests carried out for diagnosis of jaundice and its types.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Write a note on the merits and demerits of manual and automation in clinical laboratory.
  17. Explain the disorders of Tyrosine, phenyl alanine and tryptophan metabolism.
  18. Enumerate on the association between Thyroid disease and liver disease.
  19. Give a detailed note on the renal function in acute and chronic glomerular nephritis.
  20. Explain the types of diseases that can be diagnosed with the Amniotic fluid.
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**F-6379**

**Sub. Code**

**7MBC3C3**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**Third Semester**

**Biochemistry**

**MOLECULAR BIOLOGY**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define satellite DNA.
2. Name the prokaryotic transposons.
3. Write about the different types of RNA.
4. What are stop codons? Write its significance.
5. Mutation is a reversible process. Justify.
6. Define site-directed mutagenesis.
7. Write the medical significance of bacterial transposons.
8. What do you mean by  $F^+$  and  $F^-$  in conjugation?
9. Define gap genes.
10. What is gene frequency?

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write a note on chloroplast DNA.

Or

- (b) Briefly explain about yeast transposons.

12. (a) Give a brief account on post-translational modification.

Or

- (b) How do you prove DNA as genetic material? Justify with Griffith's experiments.

13. (a) Briefly explain the significance of isogenic strains.

Or

- (b) How do you analyse the mutants by genetic methods? Explain.

14. (a) Distinguish between generalised and specialised transduction.

Or

- (b) Describe composite transposons.

15. (a) Explain about genetic draft.

Or

- (b) Write about the sex determination in c.elegans.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Discuss the structure and organization of eukaryotic chromosomes.
  17. Elaborate on the various stages of transcription.
  18. Explain the different types of linkages with examples.
  19. Describe the process of conjugation.
  20. Outline the main steps in the genetic analysis of development in *Drosophila*.
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**F-6380**

**Sub. Code**

**7MBC3E2**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**Third Semester**

**Biochemistry**

**Elective : DRUG MODELLING AND DESIGNING**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define CADD.
2. What is ligand based drug designing?
3. Define efficacy.
4. What is meant by synergism?
5. What is preclinical trail?
6. What is therapeutic index?
7. How are lipophilic drugs transported across the membrane?
8. What is the relationship between drug absorption and gastric emptying rate?
9. What is QSAR?
10. Name any two drug database.

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Discuss briefly on current approaches in drug design.

Or

- (b) Write an short note on “treatment use” of investigational new drugs.

12. (a) Write a detailed note on the significance and the limitations of pre-clinical trials in drug discovery.

Or

- (b) What are the ethical issues in clinical testing? Explain.

13. (a) Discuss the importance of taxiokinetics in drug discovery process.

Or

- (b) Enumerate the adverse effects of drug interaction.

14. (a) How does the anatomical variables in the GI tract affect the drug absorption? Explain.

Or

- (b) Write a short notes on the role of ABC transports in drug absorption.

15. (a) Explain the use of molecular docking for the identification of leads for new drugs.

Or

- (b) Highlight the user of compute graphics in drug design.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Write a detailed account on biopharmaceutus consideration in drug product design.
  17. Discuss the stages of drug discovery process in detail.
  18. Elaborate on dose optimization based on pharmacokinetic pharmacodynamic model.
  19. Explain in detail on the mechanism of drug transport across the biological membrane.
  20. Describe in detail on designing of new drugs based on 3-D properties of ligands.
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**F-6527**

**Sub. Code**

**7MBC3C1**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021.**

**Third Semester**

**Biochemistry**

**GENE EXPRESSION AND METABOLIC REGULATION**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What do you mean by housekeeping genes?
2. What is attenuator?
3. Write the role of aldosterone.
4. Mention the significance of cyclic AMP.
5. Differentiate between feedback inhibition and feedback repression.
6. What is the significance of NADPH + / NADP+ ratio in carbohydrate metabolism?
7. Define apolipoproteins.
8. Highlight the importance of pH in human body.
9. What do you mean by gout?
10. Write the mode of action of sulfur drugs.

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Differentiate between agonist and antagonist with examples.

Or

- (b) Give a brief account on oncogenes.

12. (a) Briefly explain the function of phosphokinases.

Or

- (b) What is RAAS? Explain.

13. (a) Distinguish between glycogenesis and glycogenolysis.

Or

- (b) Gluconeogenesis is energetically expensive but essential? Justify.

14. (a) How does phytanic acid undergo oxidation in peroxisomes? Explain.

Or

- (b) How is aminoacid synthesis regulated by cascade of enzymes? Explain with examples.

15. (a) Discuss the catabolism of pyrimidine.

Or

- (b) Briefly explain the regulatory mechanism of the biosynthesis of adenine and guanine.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Elaborate on the mechanism of lac operon.
  17. Discuss the importance of secondary messengers in signal transduction.
  18. Give a detailed account on the two phases of glycolysis.
  19. Write a detailed account on the steps involved in the formation of ketone bodies.
  20. Explain the denovo synthesis of purine nucleotides.
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**F-6528**

**Sub. Code**

**7MBC3E1**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021.**

**Third Semester**

**Biochemistry**

**Elective : BIOPHARMACEUTICALS**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define QSAR in drug designing.
2. What are prodrugs? Give its significance in drug discovery.
3. How does route of administration affect drug absorption?
4. Define cyt P450 polymorphism. Justify its good or badness.
5. Differentiate MIC and MEC.
6. What is LD 50 and ED 50? Give its importance in relation to toxicity?
7. What are probiotics? Give any two significance.
8. Define the term tissue culture and its role in production of pharmaceutical products.
9. What are therapeutic proteins?
10. What are the advantages of pharmaceutical products developed by DNA technology?

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write short note on drug targets role in drug discovery and development.

Or

- (b) Discuss on pre-clinical and clinical trial in drug development process.

12. (a) What are the pathological factors induced by drug metabolism?

Or

- (b) Write briefly on route of administration of drug.

13. (a) Write shortly on the mechanism of action of against and antagonists.

Or

- (b) Discuss on membrane active drugs with suitable illustration.

14. (a) Write shortly on synthesis of antibiotics from microbes.

Or

- (b) Comment on synthesis of vitamin from animals.

15. (a) Give a brief account on therapeutic importance of tissue plasminogen activator.

Or

- (b) What are erythropoietin? Give its role.



**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Discuss on sources of drugs that are significant in drug discovery.
  17. Enumerate on the phases of drug metabolism. How does route of administration affect the drug metabolism?
  18. Explain on any two theories of drug activity relationship with suitable example.
  19. What are secondary metabolites present in plants? Elaborate on its metabolism, control mechanism with suitable example.
  20. Explain in detail on the production of monoclonal antibodies. Comment on its limitations and advantages.
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**F-6529**

**Sub. Code**

**7MBC3E3**

**M.Sc. DEGREE EXAMINATION, NOVEMBER 2021**

**Third Semester**

**Biochemistry**

***Elective* — HORMONES AND CELL SIGNALING**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

**(10 × 2 = 20)**

Answer **all** questions.

1. What is meant by signal transduction?
2. Define endocrine signaling.
3. Name any two targets of GPCR.
4. What are hormone receptors?
5. Mention the ligands for cytokine receptor.
6. Write the role of STAT in signal transduction.
7. What is the significance of HRE?
8. What are nuclear receptors?
9. What is membrane bound receptors? Give eg.
10. What is meant by insulin resistance?

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What are the different type of receptor present on the cell? Explain with examples.

Or

- (b) Write a short notes on intracellular receptors.
12. (a) Give a short note on structure of G-protein coupled receptor.

Or

- (b) Enumerate the consequence of mutation in G-protein coupled receptor genes.
13. (a) Present JAK-STAT signaling pathway with neat diagram.

Or

- (b) How is cAMP involved in signal transduction? Explain.
14. (a) What are hormone response elements? Explain.

Or

- (b) Explain the structure and function of nuclear receptor.
15. (a) Illustrate the activating mutation of hormone receptor with example.

Or

- (b) Discuss the role of hormone receptors in diseases.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Explain the classification of hormones based on structure with examples.
  17. Elaborate the mechanism of signal transduction pathway of G-protein coupled receptor.
  18. Give an account on mechanism of action of steroid hormone receptor.
  19. Describe the structure and activation of receptor tyrosine kinase.
  20. Write an essay on G-protein mutations.
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**F-5432**

**Sub. Code**

**7MBC1E2**

**M.Sc DEGREE EXAMINATION, NOVEMBER 2021**

**First Semester**

**Biochemistry**

**ELECTIVE: NUTRITIONAL BIOCHEMISTRY**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What are essential fatty acids?
2. Mention the significance of dietary fibre.
3. What are the clinical features of Kwashiorkor?
4. Name any four essential amino acids?
5. List the dietary sources of vitamin K.
6. State the deficiency symptoms of vitamin A.
7. Define Hyperlipidemia.
8. Write the symptom of homocystinuria.
9. What is allergy. List any two allergens?
10. Mention any two hepatotoxins.

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Give an account on the properties and composition of plasma lipoproteins.

Or

- (b) Discuss about the factors affecting BMR.

12. (a) Give an account on nitrogen balance and factors influencing nitrogen balance.

Or

- (b) Discuss the protein metabolism in prolonged fasting.

13. (a) Describe the biochemical functions of vitamin C.

Or

- (b) Discuss the nutritional significance of iron.

14. (a) Discuss the role of diet in the prevention of dental caries and fluorosis.

Or

- (b) Write short notes on diabetes insipidus.

15. (a) Comment on haemagglutinins.

Or

- (b) Give an account on protease inhibitors.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Give a detailed account on the measurement of energy expenditure by direct and indirect calorimetry.
  17. Discuss on protein energy malnutrition with respect to marasmus.
  18. Describe the biochemical functions and deficiency diseases of vitamin D.
  19. Give an account on Phenylketonuria and maple syrup diseases.
  20. Explain in detail the diagnosis and management of allergy.
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