

FACULTY OF SCIENCE

M.Sc. I – Semester (CBCS) Examination, September 2021

Subject: BIOCHEMISTRY

Paper – I: Chemistry and Metabolism of Proteins and Lipids and Porphyrins

Time: 2 Hours

Max. Marks: 80

PART – A

Note: Answer any five questions.

(5x7 = 35 Marks)

- 1 Non-protein amino acids
- 2 Cyclic peptides
- 3 Metabolism of branched chain amino acids
- 4 Carbamoyl phosphate synthetase-I deficiency
- 5 Steroid hormones
- 6 Isoprene units and their significance
- 7 Desaturation of fatty acids
- 8 Leukotriene biosynthesis

PART – B

Note: Answer any three questions.

(3x15 = 45 Marks)

- 9 Give an account of general properties, acid-base titrations and pI of amino acids
- 10 Explain the salient features of α - Helix, 3-10 helix, β - sheets.
- 11 Which amino acids are degraded to pyruvate? Explain their pathways.
- 12 Explain the metabolism of phenylalanine and tyrosine and add a note on their metabolic disorders.
- 13 Write down the structures and functions of bile acids, bile salts and porphyrins.
- 14 Give an account of the sphingolipids and phospholipids and their importance.
- 15 Discuss in detail about the different types of lipoproteins and their physiological roles.
- 16 Explain the biosynthesis of cholesterol. Add a note on its regulation.

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Paper –II: Chemistry and Metabolism of Carbohydrates,
Vitamins and Nucleic Acids

Time: 2 Hours

Max. Marks: 80

PART – A

Note: Answer any five questions.

(5x7 = 35 Marks)

- 1 Composition of oligosaccharides with any two examples
- 2 Reducing property of sugars
- 3 Anaplerotic reactions
- 4 Glyoxalate cycle
- 5 tRNA structure
- 6 Salvage pathway for pyrimidines
- 7 Classification of Vitamins
- 8 Biological role of Vitamin K

PART – B

Note: Answer any three questions.

(3x15 = 45 Marks)

- 9 Give an account of the classification of carbohydrates, and discuss the configuration of monosaccharides.
- 10 Define glycosaminoglycans and their types. Explain the composition and biological role of any three.
- 11 Write down the reactions of TCA cycle and discuss about its energy yield.
- 12 Describe the structure of chloroplast and explain the light and dark reactions of Photosynthesis.
- 13 Give a detailed note on different forms of DNA along with their significance.
- 14 Explain the steps involved in biosynthesis of purine nucleotides.
- 15 Write an account on the types of B vitamins and their deficiency disorders.
- 16 Elaborate on the sources, functions and deficiency disorders of Vitamin C and D.

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Paper- III: Bio Analytical Techniques

Time: 2 Hours

Max. Marks: 80

PART – A

Note: Answer any five questions.

(5x7 = 35 Marks)

- 1 Electromagnetic spectrum
- 2 Chromophore concept
- 3 Solvent systems and adsorbents of TLC
- 4 FPLC
- 5 Basic principles of centrifugation
- 6 Denaturing gels for RNA
- 7 Units of Radioactivity
- 8 Primary and secondary fluors used in liquid scintillation counting

PART – B

Note: Answer any three questions.

(3x15 = 45 Marks)

- 9 Draw the diagram of UV-VIS double beam instrument with labeling and enumerate the applications of UV-Vis Spectrophotometry
- 10 Describe the principle and applications of ESR and X-ray crystallography
- 11 Discuss about Principle, instrumentation and applications of HPLC
- 12 Write a note on Peptide mapping and explain the Principle and applications of gel filtration
- 13 How nucleic acids are separated using agarose gel electrophoresis? Explain.
- 14 Write a note on Sucrose gradient centrifugation and explain Northern blotting technique
- 15 Give an account of measurement of radioactivity by GM-counter and gamma counter.
- 16 Write about Isotope dilution method and Safe disposal of radioactivity waste

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Subject: BIOCHEMISTRY

Paper –IV: Bioenergetics & Cell Biology

Time: 2 Hours

Max. Marks: 80

PART – A

Note: Answer any five questions.

(5x7 = 35 Marks)

- 1 Integral membrane proteins
- 2 Structure of Light harvesting complex (LHCII)
- 3 Structure and function of various glycocalyx
- 4 Compare the cell wall structures of Gram positive and Gram negative bacteria
- 5 Vesicle trafficking
- 6 Poytene chromosome
- 7 Resolution and magnification of a microscope
- 8 FRAP

PART – B

Note: Answer any three questions.

(3x15 = 45 Marks)

- 9 Although the change of standard free energy (ΔG) values for two reactions that sum to a third are additive, the Equilibrium constants (K_{eq}) for the same are multiplicative—explain the statement. Describe the water-splitting activity of the oxygen-evolving complex.
- 10 Describe ATP driven active transport in light of $Na^+ - K^+ - ATPase$. Explain cyclic photophosphorylation?
- 11 Compare the minimal, selective and enriched media highlighting important advantages and disadvantages of each.
- 12 Describe the growth of bacteria in batch culture. How is this different from continuous culture?
- 13 Describe various fine structures of chromatin and chromosome.
- 14 Describe extrinsic and intrinsic apoptotic pathways with regard to their mechanistic variation.
- 15 Describe the principle and application of atomic force microscopy and scanning electron microscopy.
- 16 Describe in detail the technical advantages of confocal microscopy over conventional fluorescence microscopy. Describe the freeze fracture technique.
