[This question paper contains 5 printed pages]

Your Roll No .

5805 **J**

B.Sc. (Hons.)/II

BIOCHEMISTRY—Paper X

(Metabolism of Amino Acids, Nucleotides and Porphyrins)

(Admissions of 2000 and onwards)

Time . 3 *Hours* *Maximum Marks* 60

(Write your Roll No on the top immediately on receipt of this question paper)

Attempt **Five** *questions in all, including Question No* **1** *which is compulsory*

1. A. Explain the following : $5 \times 2 = 10$

   (a) Glutamate dehydrogenase is considered as a significant control point for control of ammonia production in a cell

   (b) Supplementing the amount of folic acid in the diet of homocysteinuria patients reduces blood concentration of homocysteine to a safe level

   (c) dATP at low concentrations is an activator of Ribonucleotide Reductase, whereas at higher concentration, it becomes inhibitory

   (d) Deficiency of Vit B_{12} results in a decrease in the number of RBCs which can be restored by folate ingestion However, prolonged deficiency of Vit B_{12} results in neurological disorders

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(e) Allopurinol is often given to patients with acute leukemia who are being treated with anti-cancer drugs Why is Allopurinol used?

B Name 6

(a) A multifunctional enzyme of pyrimidine biosynthesis

(b) The compound which links urea cycle with TCA cycle

(c) The pacemaker enzyme of the urea cycle

(d) The analogue of hypoxanthine in which nitrogen and carbon atoms at 7th and 8th positions are interchanged

(e) Enzyme deficient in Alkapton urea

(f) Enzyme involved in Salvage Pathway

2 A Compare the any *two* of the following pairs $2 \times 3 = 6$

(a) Erythropoietic protoporphyria and Intermittent porphyria

(b) Carbamoyl Phosphate Synthetase I and II

(c) Oxidative deamination and Transamination

B In amino acid metabolism PLP plays a significant role as a co-factor Give three examples of enzymes in amino acid metabolism where PLP acts as a co-factor 5

3 A Write down the stpes involved in the conversion of . $5 \times 2 = 10$

(a) Arginine to Creatine

(b) Ornithine to Spermidine

(c) Cytidine to β alanine

(d) Homocysteine to Methionine

(e) Hydroxy phenyl pyruvate to Homogentisic acid

B Plants do not possess δ-aminolevulinic acid synthetase activity, yet porphyrins are required for the synthesis of chlorophyll 1

4 A Briefly mention the contributions of the following scientists (Any *three*) $3 \times 1 = 3$

(a) John Bachanan and Robert Greenberg

(b) Mary Ellen Jones

(c) David Shemin

(d) Hans Krebs and Kurt Henseleit

B Give the mode of action of the following inhibitors and their use in medicine $4 \times 2 = 8$

(a) Sulphanilamides

(b) Cytosine arabinoside

(c) Hydroxylurea

(d) Azaserine

5 Explain the biochemical basis of the following metabolic disorders and name the defective enzyme

$2 + 2 + 3 + 2 + 2 = 11$

(a) Lead poisoning

(b) Orotic acidurea

(c) SCID

(d) Maple syrup urine disease

(e) Parkinson's disease

6 A Write short notes on $4 \times 2 = 8$

(a) Purine-nucleotied cycle

(b) γ-glutamyl cycle for the transport of amino acids

(c) Glucose-Alanine cycle

(d) Krebs bicycle

B Give *one* example each of a reaction requiring the following coenzymes $2 \times 1 = 2$

(a) Molybdopterin

(b) N^5, N^{10} methylene tetrahydrofolate

C Draw the purine ring indicating donor molecules 1

7 Answer in brief

(a) The regulation of urea cycle 3

(b) S-adenosylmethionine serves as a methyl group donor in many reactions Give two examples 2

(c) Blood plasma contains all the amino acids required for the synthesis of body proteins, but they are not present in equal concentrations Two amino acids are present in much higher concentrations in

normal human blood plasma Name them and suggest possible reasons for their abundance. 3

(d) The synthesis of spermidine 3

8. (a) Describe the Nitrogenase complex and explain the roles of its Reductase and Nitrogenase components 4

(b) Write the reactions involved in the conversion of glutamate to proline 2

(c) Explain the regulation of heme biosynthesis 3

(d) Arginine and proline catabolic pathways converge at the same molecule Write down the steps and enzymes involved in complete degradation of this molecule 2