[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 1777 **C** **Roll No.....**

Unique Paper Code : 249403

Name of the Course : B.Sc. (Hons.) Biochemistry

Name of the Paper : Metabolism of Amino Acids and Nucleotides : BCHT-407

Semester : IV

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all, including Q. No. 1 which is compulsory.

1. Explain the following :

   (i) As a coenzyme, pyridoxal phosphate is covalently bound to enzyme with which it functions, yet during catalysis the coenzyme is not covalently bound.

   (ii) The only known methyl group transfer that does not involve SAM is the synthesis of methionine itself.

   (iii) Persons on a high protein diet are advised to drink lots of water.

   (iv) Deficiency of vitamin B12 results in a decrease in the number of RBCs which can be restored by folate indigestion.

   (v) In humans, the major route of nitrogen metabolism from amino acid to urea is catalyzed by the combined action of transaminase and glutamate dehydrogenase.

   (vi) dATP is toxic to mammalian cells.

   (vii) Mature RBCs are unable to synthesize heme.

   (viii) von Gierke's disease result in hyperuricemia.

(ix) Plants do not possess δ amino levulinic acid synthetase activity yet porphyrins are required for the synthesis of chlorophyll.

(x) Polyamines are required for cell proliferation. (2×9+1=19)

2. Write short notes on the following :

(i) Purine nucleotide cycle

(ii) Glucose alanine cycle

(iii) Regulation of biosynthesis of deoxyribonucleotide (4,5,5=14)

3. (a) Give the mode of action of the following inhibitors and their use in medicine :

(i) Azaserine

(ii) Sulphanilamide

(iii) Trimethoprim

(iv) Allopurinol

(v) Hydroxyurea (2×5=10)

(b) Show how different organisms help to recycle nitrogen in the atmosphere. (4)

4. (a) Differentiate between the following pairs :

(i) Positive and negative nitrogen balance

(ii) Carbamoyl phosphate synthetase I and II

(iii) Transamination and oxidative deamination (4×3=12)

(b) Which derivative of folate is a reactant in the conversion of :

(i) Glycine into serine

(ii) Homocysteine into methionine (1×2=2)

5. Give the biochemical basis of any four of the given metabolic disorders and name the defective enzyme :

   (i) Lesch Nyhan syndrome

   (ii) Orotic aciduria

   (iii) Phenylketonuria

   (iv) Maple syrup urine disease

   (v) SCID (3.5×4=14)

6. Write down the steps to accomplish the given conversions **(any 7)**

   (i) Tyrosine to melanin

   (ii) Histidine to N-forimino glutamate

   (iii) Guanine to uric acid

   (iv) dUMP to dTTP

   (v) Arginine to creatine

   (vi) Tryptophan to nicotinamide adenine dinucleotide

   (vii) Ornithine to spermine

   (viii) Methionine to homocysteine (2×7=14)

7. (a) Give one significant contribution of the following scientists :

   (i) P. Reicherd

   (ii) John Buchanan

   (iii) JoAnne Stubbe

   (iv) A. Folling (1×4=4)

P.T.O.

(b) (i) What are the different pathways for breakdown and synthesis of glycine ?

(ii) What are the steps involved in the degradation of heme ?

(iii) Since dUTP is not a normal component of DNA, why do you suppose ribonucleotide reductase has the capacity to convert UDP to dUDP ?

(4,3.3=10)

8. (a) Consider the regulation of *E. coli* glutamine synthetase (GS) and explain the metabolic rationale for each of the following effects :

(i) Inhibition of GS by carbamoyl phosphate

(ii) Inhibition of the deuridylylation of PII-UMP by α keto glutarate

(iii) Activation of uridylylation of PII by ATP (2×3=6)

(b) Write the role of pyridoxal phosphate in amino acid metabolism. (4)

(c) Arginine and proline catabolic pathways converge at the same molecule. Write down the steps and enzymes involved in complete degradation of this molecule. (4)