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Roll No. | | | | | | | | | | |

S. No. of Question Paper : 44

Unique Paper Code : 32171501 I

Name of the Paper : Organic Chemistry–IV

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

Semester : V

Duration : 3 Hours Maximum Marks : 75

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

Question No. 1 is compulsory.

Attempt *six* questions in all.

1. Answer any *five* of the following : 5×3

(*a*) What are essential amino acids ? Name any *two* giving their structures.

(*b*) Explain Chargaff's rule. What is its significance ?

(*c*) Give the structure of the main alkaloid present in Curcumin. Discuss the therapeutic uses of curcumin.

P.T.O.

(*d*) What are drying, non-drying and semi-drying oils ? Explain giving suitable examples.

(*e*) Complete loss of α-helical conformation takes place when a protein is dissolved in urea solution. Explain.

(*f*) Write the structure of FAD. Giving an example, explain its role in biochemical reactions catalyzed by enzymes.

(*g*) What is K_M value ? Explain its significance.

2. (*a*) An octapeptide, A, on complete hydrolysis gave the following amino acids :

Phe, Ser, Ala, Val, Met, Gly, Trp, Arg (1 unit each)

Treatment with dansyl chloride (DNS-Cl) followed by hydrolysis gave the DNS-derivative of Ala. Hydrazinolysis gave Gly as free acid. on treatment with Chymotrypsin, A gave :

(Phe, Ser, Ala); (Gly, Arg, Val, Met); free Trp

Trypsin treatment cleaved A into a dipeptide and a hexapeptide. CNBr treatment gave a pentapeptide and a tripeptide. Determine the sequence of amino acids in A and explain the reactions involved.

(*b*) How will you prepare Tyrosine by Erlenmeyer Azlactone synthesis ?

(*c*) List the six main groups of enzymes according to the Enzyme Commission. What functions do they perform ? 6,3,3

3. (*a*) Give the synthesis of Lys-Gly-Ala by Active Ester method using *p*-nitrophenol.

(*b*) Differentiate between any *two* of the following :

(*i*) Lock and Key model and Induced Fit model of enzyme activity

(*ii*) Reversible and irreversible inhibition of enzyme activity

(*iii*) Fibrous and globular proteins. 6,3×2

4. (*a*) Write all the possible tautomeric forms of base uracil. Out of these, which form is present in RNA ? How will you synthesize uracil from urea and ethyl acrylate ?

(*b*) Give the structure of ATP and write the reactions involved in the complete hydrolysis of ATP.

P.T.O.

(*c*) Define saponification value of an oil. Calculate the saponification value of a triglyceride whose molecular weight is 884. 6,3,3

5. (*a*) How do you elucidate the structure of chloroamphenicol ? Discuss its unique structural features.

(*b*) What is Glycolysis and where does this process occur in the cell ? Outline the complete glycolytic pathway giving structures of intermediates and enzymes involved. 6,6

6. (*a*) Give the synthesis of chloroquine from m-chloroaniline. Why can it not be used for complete cure of malaria ?

(*b*) How is pyruvate converted into lactic acid and ethanol under anaerobic conditions ? What are these reactions called ?

(*c*) Give the mechanism of ninhydrin reaction with alanine. 6,3,3

7. (*a*) For amino acid aspartic acid, $pK_1 = 2.09$, $pK_2 = 9.82$ and $pK_3 = 3.86$. Calculate its pI value. Give the structure of zwitter ion of aspartic acid.

(*b*) Give Traube's method for the synthesis of adenine.

(*c*) Draw structures of the following :

(*i*) 3'-*d*GMP

(*ii*) An ω-3 fatty acid

(*iii*) Palmitic acid

(*iv*) Asparagine. 4,4,4

8. Write short notes on any *three* of the following :

(*i*) Structure and therapeutic uses of Vitamin C

(*ii*) Simple, conjugated and derived proteins

(*iii*) Coenzymes and Cofactors

(*iv*) Rancidity of oils and fats. 4,4,4