3 (Sem–5/CBCS) CHE HC 1

2024

CHEMISTRY

(Honours Core)

Paper : CHE–HC–5016

(Organic Chemistry – IV)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : 1×7=7

   (a) Adenosine is a _____.

   (b) Adenosine 5′- monophosphate is a ___.

   (c) Why α - amino acids (except glycine) are optically active ?

   (d) Give an example of Dipolar ion.

(e) Give an example of metalloenzyme.

(f) Give an example of triaclyglycerol.

(g) Lauric acid is a ____ acid.

2. Answer the following questions : 2×4=8

(a) What are the *four* different bases present in DNA ?

(b) Draw the structures of adenosine and 2′ - deoxyadenosine.

(c) Write down the equations for the reaction of glycine with $NaOH_{(aq)}$ and $HCl_{(aq)}$.

(d) What do you mean by functional group interchange (FGI) and functional group addition ?

3. Answer ***any three*** of the following : 5×3=15

(a) Explain the statement –
"ATP is the carrier of Chemical Energy".

(b) Indicate whether each functional group of the five heterocyclic bases in nucleic acids can function as a hydrogen bond acceptor, (A), a hydrogen bond donor (D), *or* both (D/A).

(c) What do you mean by pI value of an amino acid ? Which amino acid has the lowest pI value and which amino acid has the highest pI value ? Give reasons.

(d) What are the enzymes and co-enzymes ? Give examples. *(one for each)*

(e) Define Saponification number and Iodine number. In what way these have proved useful in the analysis of oils and fats.

(f) (i) Why are the carboxylic acid groups of the amino acids much more acidic ($pKa \sim 2$) than a carboxylic acid ($pKa \sim 4 \cdot 76$) such as acetic acid.

(ii) Draw the form in which each of the following amino acids predominantely exists at physiological pH. (pH = 7·3)
aspartic acid, glutamine, arginine, lysine, histidine, tyrosine

4. Answer ***any three*** of the following : 10×3=30

(i) (a) What do you mean by a peptide bond ? Draw a structure of dipeptide by depicting the N-terminal and C-terminal amino acids. 2+3=5

(b) Predict the products of the following reactions : 1×5=5

(I) N-benzoyl glycine + $SOCl_2 \rightarrow$

(II) Product of $(I) + NH_3 \rightarrow$

(III) Product of (I) + alamine $\rightarrow$

(IV) Product of $(I) + C_2H_5OH \rightarrow$

(V) Glutamic acid + one equivalent of $NaHCO_3 \rightarrow$

(ii) (a) Write *one* method of each of synthesis of adenine and thymine.

(b) Describe a method how the C-terminal residue of a polypeptide chain can be analysed.

(c) Name *one* amino acid which is not found in α - helix.

5+4+1=10

(iii) Write short notes on the following : 3+3+4=10

(a) Oxidation of food stuffs and cellular energy

(b) Catabolism and anabolism

(c) Metabolic pathways of carbohydrates

(iv) (a) Write a method of synthesis of paracetamol

(b) Mention *four* qualities that an antibiotic must possess.

(c) Mention *one* medicinal value of turmeric and neem.

(d) Name *two* useful drugs which are employed as antimalerials.

(e) Give a synthetic method for chloramphenicol.

2×5=10

(v) (a) Draw the structures of DNA and RNA.

(b) If one of the strands of DNA has the following sequence of bases running in the 5′→3′ direction

5′ – G – G – A – C – A – A – T – C – T – G – C – 3′

What is the sequence of bases in the complementary strand ? What are the forces that keep the *two* strands of DNA together ?

5+5=10

(vi) Write short notes on : 2½×4=10

(a) Lipids

(b) Enzymes

(c) Nuclic Acids

(d) Polypetides
