

- N.B. : 1. All questions are compulsory.
2. Numbers to the right indicate full marks.

1. (a) Answer any two of the following : 8
- (i) With respect to medicinal chemistry, discuss the following terms :
 - (a) Therapeutic Index
 - (b) Bioavailability
 - (ii) Discuss the pharmacokinetics in 'bio-transformation' and in 'drug elimination' from the body.
 - (iii) How was penicillin discovered without 'lead' ?
 - (iv) How are leads obtained in drug discovery ?
- (b) Answer any one of the following : 4
- (i) How do 'homologation' and 'chain-branching' affect the activity of a drug ?
 - (ii) Discuss 'bioisosterism'. Give three examples each, of classical and non-classical bioisosters.
2. (a) Answer any two of the following : 8
- (i) Explain the functions of ribonucleotides.
 - (ii) Discuss the secondary structure of proteins.
 - (iii) Give the H-phosphonate method for the synthesis of oligonucleotides
 - (iv) How are oligonucleotides synthesised by the phosphoramidite method?
- (b) Answer any one of the following : 4
- (i) How is the sequence of amino acids in a protein molecule determined?
 - (ii) Explain the process of replication of a DNA molecule ?
3. (a) Answer any two of the following : 8
- (i) Match the following enzymes with their main class :
- | Enzyme | Main class |
|------------------------------|---------------------|
| (I) Phosphorylase | (A) Lyases |
| (II) Lipases | (B) Transferase |
| (III) Pyruvate decarboxylase | (C) Hydrolases |
| (IV) Peptide synthetase | (D) Ligases |
| | (E) Oxidoreductases |

- (ii) Explain how the rate of enzyme catalysed reaction depends on :
- (I) Temperature
 - (II) Enzyme concentration

(iii) What is active site in an enzyme ? Discuss its characteristics.

(iv) Explain how orientation and steric effect play an important role in the mechanism of enzyme action.

(b) Answer any one of the following :

(i) Give the important features of the mechanism of chymotrypsin catalysed hydrolysis of a peptide bond.

(ii) Write a note on enzyme specificity.

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4. (a) Answer any two of the following :

(i) How is 6-methylsalicylic acid biosynthesised from acetyl coenzyme A

(ii) Give the biosynthesis of phenylalanine from shikimic acid

(iii) Explain the general principles involved in the biosynthesis of terpenoids

(iv) How is lanosterol biosynthesized from squalene ? Explain the steps involved.

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(b) Answer any two of the following :

(i) Give reactions to show the biotransformation of chorismate to L-Tryptophan

(ii) Give the biosynthesis of saturated fatty acids.

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5. Answer any four of the following :

(a) Discuss the double-helix structure of the DNA molecule.

(b) Give the structure and the importance of ATP in the body.

(c) What is the importance of 'structure activity relationship studies' in lead modification of a drug.

(d) Explain how isomerism is important in changing the level of drug distribution in the body.

(e) What is covalent catalysis in an enzymatic process ?

(f) Explain transition state theory in the mechanism of enzyme action.

(g) Explain the general principles involved in the biosynthesis of alkaloids.

(h) Explain the terms :

(I) Primary metabolites

(II) Precursors

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