(2½ Hours) [Total Marks : 60

N.B. : (1) All questions are compulsory.
(2) Figures to the right indicate full marks.

1. (a) Answer any two of the following :- 8
(i) What is meant by 'Quantitative structure activity relationship'? What are the different parameters that may be studied under QSAR? How can the effect of steric factors be predicted?
(ii) Explain one method used to correlate regression parameters with biological activity, giving its uses and limitations.
(iii) Explain how biotechnology is used to help in designing drugs.
(iv) Explain giving three reasons, why drugs are converted into prodrugs. Give any two types of prodrugs with examples.

(b) Answer any one of the following :- 4
(i) Give the synthesis and applications of -
I] Labetalol II] Cetrizine
(ii) Give the synthesis and uses of the following -
I] Fluoconazone II] Esomeprazole.

2. (a) Attempt any two of the following :- 8
(i) Give the mechanism of the conversion of methylmalonyl-CoA to succinyl - CoA by an enzyme dependant on Co-enzyme Vitamin B_{12}.
(ii) What are the characteristics of a good biomodel? Give one example. Explain how alcohol dehydrogenase with NAD^+ coenzyme brings about stereospecific dehydrogenation of alcohols.
(iii) Give the mechanism of action of pyridoxal phosphate. How did biomodeling show that the proton transfer step of pyridoxal phosphate - mediated transaminations are stereospecific.
(iv) With respect to pyruvate decarboxylase, write the structure and mechanism of action of thiamine pyrophosphate.

(b) Attempt any one of the following :- 4
(i) Discuss oxygen activation in biological systems with respect to cytochromes.
(ii) What are co-enzymes? What is the mechanism of action of co-enzyme A in the biosynthesis of fatty acids.

3. (a) Attempt any two of the following :- 8
(i) Give four examples to show how enzymes catalyse oxidation reactions.
(ii) Explain how enzymes catalyse hydrolysis reactions. Illustrate your answer with four examples.
(iii) Give the synthesis of L-ephedrine via microbial transformation.

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(iv) Discuss the production of amino acids by fermentation techniques.

(b) Answer any **one** of the following :- 4

(i) Discuss the production of 6 - amino - penicillanic acid using the immobilised form of an isolated enzyme.

(ii) Illustrate enzyme-catalysed hydroxylation reactions with four examples.

4. (a) Answer any **two** of the following :- 8

(i) How are polymer-supported reagents used in green synthesis? Give two examples.

(ii) Write a note on 'Ultrasound' assisted organic reactions, giving suitable examples.

(iii) Discuss how microwave irradiation is used in green synthesis giving illustrative examples.

(iv) Why are 'solid state' reactions called 'green'? Discuss any two solid phase syntheses.

(b) Attempt any **one** of the following :- 4

(i) Give the traditional process for the synthesis of parabromotoluene. Give reasons why this process is not green. Compare it to the present green synthesis of the same compound.

(ii) Compare the traditional and the green synthesis of para amino diphenylamine and give the advantages of the green synthesis.

5. Answer any **four** of the following :- 12

(a) Explain the modern method of drug design based on computer-aided molecular graphics.

(b) Explain the term 'soft drug'. What are its properties? Give two examples.

(c) Give the structure and mechanism of action of the co-enzyme lipoic acid-mediated pyruvate dehydrogenase.

(d) Give the structure of FAD. Using only the active parts of NADH and FAD (abbreviated structure), illustrate their mutual oxidation - reduction interaction.

(e) Explain the role of glucosyl transferase in the breakdown of glycogen.

(f) What is the role of glycogen synthetase in the synthesis of glycogen (explain mechanism).

(g) Give the structure and name of any one ionic liquid. Why are ionic liquids called 'green solvents'? Give two applications of ionic liquids in green synthesis.

(h) Write a note on any three factors that are to be condsidered for a 'green synthesis'.
