(2½ Hours) [Total Marks : 60

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

1 (a) Answer any two of the following: 8

(i) Explain the term 'prodrugs'. Illustrate how the carboxylic acid group and the alcohol group are utilised in the synthesis of prodrugs.

(ii) I. Explain the studies carried out by Taft, regarding 'quantitative' structure activity relationships' (QSAR) with respect to drugs. Give the Hancock modification of the Taft equation.

II. Give the Lorenz - Lorenz equation for molar refractivity.

(iii) How is the 'computer-aided molecular graphics' used for drug design? What are its advantages and limitations?

(iv) Explain the studies carried out by Hansch for quantifying the relationship of structure to the activity of the drug. Give the two forms of the modified Hansch equations.

(b) Attempt any one of the following: 4

(i) Give the synthesis and one application of each of the following:

I Methotrexate

II Diclofenac

(ii) Give the synthesis and one application of each of the following.

I Labetalol

II Esomeprazole

2. (a) Attempt any two of the following: 8

(i) Give the structure and metabolic functions of NAD^+ dependent enzymes.

(ii) Explain the catalytic mechanism of thiamine pyrophosphate with reference to pyruvate decarboxylase.

(iii) Using active part of the molecules, show how NADH is oxidized by FAD by hydride transfer mechanism.
Give a biomodel to support this mechanism.

(iv) Give the structure and metabolic functions of pyridoxal phosphate dependent enzymes.

(b) Answer any one of the following: 4

(i) Match the following:

I.	NADPH	A)	Cyclic disulphide
II.	Coeneyme B_{12}	B)	Coenzyme A
III.	Lipoic acid	C)	Anabolic reactions
IV.	Pantoic acid	D)	Isomerization

(ii) Explain in brief, the oxygen activation in biological systems with reference to cytochromes.

3. (a) Answer any one of the following: 8

(i) Giving examples show how chiral hydroxy acids are prepared by enzymatic processes.

(ii) Explain how β - lactam antibiotics are produced by fermentation.

(iii) Give any two examples of each of the following enzyme catalyzed reactions.

I. Hydrolysis

II. Oxidation

(iv) How are enzymes immobilized ? What are the advantages of this technique?

(b) Answer any one of the following: 4

(i) Explain the role of glycogen phosphorylase in the breakdown of glycogen.

(ii) Illustrate how microbial transformation is employed in the synthesis of L-ephedrine.
Mention the importance of ephedrine.

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

(i) I. Explain 'solvent free solid state synthesis' with reference to aldol condensation.

II. Give the 'solid supported organis synthesis'. of pyridines with all the required conditions.

(ii) Explain the principles of the use of microwaves in organic synthesis. What are the requisite conditions? Why is the use of microwaves considered a 'green' method?

(iii) Justify how do the following contribute to green synthesis.

I. Super critical carbon dioxide

II. Green oxidation catalysts

(iv) What are biocatalysts? Why is the use of biocatalysts considered a green practice? Give two reactions brought about by Baker's yeast.

(b) Attempt any one of the following : 4

(i) Give the traditional process and the green process for the synthesis of adipic acid and give the advantage of the green process.

(ii) Give the traditional process and the green process for the synthesis of Ibuprofen and give the advantage of the green process.

5. Attempt any four of the following : 12

(a) Give the synthesis and one application of fenofibrate.

(b) Give the synthesis and one application of fluconazole.

(c) Acetyl coenzyme A has a high acetyl group transfer potential. Explain.

(d) Give the mechanism of action of biotin dependent Acetyl CoA carboxylase.

(e) Explain the chemical process with an enzyme in free from with reference to hydrocyanation of m-methoxybenzaldehyde.

(f) Giving examples show how amino acids are prepared by enzymatic processes.

(g) Give two examples of the ultrasound assisted reactions and explain why they are called green reactions.

(h) Explain, giving one example each, any three important considerations in designing a green organic synthesis.
