[Time 2[1]/2 Hours] **[Marks: 75]**

N.B. **(1)** Attempt **all** questions, **all** questions carry **equal marks**.
(2) Do not write **any explanation** for **labelled diagram** and **schematic representation questions**.

Q. I. A. Answer the following (Attempt any two) **[10]**

1. Discuss the role of cell membrane in solute transport with respect to proteins and permeability.
2. How are membrane vesicles and proteoliposomes used to study solute transport?
3. Differentiate between Group translocation and Passive diffusion (any five points).
4. With the help of a neat labeled diagram represent various transport processes in *E coli*.

Q. I. B. Do as directed (Attempt any five) **[05]**

1. Define symport
2. Give an example of a solute transported by ABC transporter.
3. Explain Mechanosensitive channel.
4. State true or false. In facilitated diffusion solute moves against the concentration gradient.
5. Define binding proteins.
6. Give an example of a cellular process which involves membrane fusion.
7. Name a solute transported by facilitated diffusion in bacteria.
8. Give an example of a siderophore.
9. Write another name for carrier protein.
10. Name the binding protein of the maltose transport system.

Q. II. A. Answer the following (Attempt any two) **[10]**

1. Write a note on Cytochromes as electron carriers.
2. Discuss biochemistry of bioluminescence.
3. Discuss electron transport chains operating in *E. coli* under anaerobic condition.
4. Explain the role of oxalate formate exchange in generation of electrochemical energy.

Q. II. B. Do as directed (Attempt any five) **[05]**

1. *Halobacterium* uses light energy to generate electrochemical gradient. State true or false.
2. Write a word equation to represent substrate level phosphorylation.
3. Name an inhibitor of mitochondrial ETC which blocks transfer of electrons from cytochrome c to oxygen.
4. Define coupling site.
5. Give an example of universal electron acceptor.
6. Explain –Rieske Fe-S protein.
7. In the equation $\Delta G0' = -nF\Delta E^{0'}$, what does 'n' represent?
8. Inner membrane of mitochondria houses ETC. State true or false.
9. Name any one prosthetic group associated with mitochondrial complex I.
10. Explain-P/$2e^-$ ratio

Q. III. A. Answer the following (Attempt any two) [10]

1. How is cellulose hydrolyzed by microorganisms?
2. With the help of chemical structures, enzymes and cofactors/coenzymes explain the oxidation of acetyl CoA to succinic acid by the Kreb's cycle.
3. Give any five differentiating points between HMP pathway and EMP pathway.
4. Schematically explain the glyoxylate pathway.

Q. III. B. Do as directed (Attempt any five) [05]

1. Define amphibolic pathway.
2. Give the structure of Fructose 1,6 biphosphate.
3. Name the enzyme that converts glucose to 6 phosphogluconic acid.
4. Name an enzyme that hydrolyzes sucrose.
5. State the importance of NMR spectroscopy in the study of metabolism.
6. Which two metabolic pathways for glucose metabolism can be confirmed by Radiorespirometry?
7. Give the structure of pyruvate.
8. With the help of only word equation write the reaction catalyzed by triose phosphate isomerase.
9. β-Galactosidase hydrolyses lactose to Glucose + _____.
10. Define sequential induction.

Q.IV. A. Answer the following (Any two) [10 Marks]

1. Using structures and enzymes represent butanol branch of butanol-acetone fermentation.
2. Describe briefly alcohol fermentation by bacteria and yeast.
3. Schematically represent heterolactic fermentation.
4. Using appropriate scheme, explain membrane bound reaction of peptidoglycan synthesis

Q.IV.B. Do as Directed (Any five) [5 Marks]

1. Which amino acid is present at the third position in a peptide of NAMA of *E.coli*.
2. Name an enzyme synthesizing OAA from pyruvate during gluconeogenesis.
3. Which enzyme cleaves Fructose-6-phosphate using inorganic phosphate to Erythrose-4-phosphate and aceyl-phosphate?
4. Antibiotic_____ inhibits formation of dipeptide of D-alanine. Fill in the blank.
5. Butyric acid/ Butanol is the fermentation end product of *C. butyricum*. Choose the correct alternative.
6. State True or False: Phosphofructokinase can hydrolyze Fructose-1,6-bisphosphate.
7. Which substrate is used by propionate fermenting bacteria?
8. Name an organic solvent produced as an end product during mixed acid fermentation.
9. Using word equation, represent reaction catalyzed by α-acetolactate decarboxylase.
10. Give chemical structure of Succinic acid.

Q. V. Answer the following (Attempt any three) **[15]**

1. Explain the mechanism of biosynthesis of ATP catalyzed by mitochondrial ATPase.
2. Write a note on mitochondrial complex III.
3. Write a short note on Active transport.
4. Write a short note on Bifidum pathway.
5. Schematically explain how cellulose is degraded. What is the final product of cellulose degradation?
6. Explain glycogen molecule with respect to its biochemical structure and occurrence and also discuss role of glycogenin.
