[Time 3 Hours] [Marks: 100]

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. 1. A. Answer the following (Attempt any two) [12]

1. Discuss the use of liposomes and proteoliposomes to study solute transport.
2. Discuss the properties of phospholipids which confer characteristic features on the membrane.
3. Discuss the assembly of proteins into membranes and protein export.
4. Schematically represent the sugar-phosphotransferase system.

Q. I. B. Do as directed (Attempt any eight) [08]

1. Define shock sensitive transport system.
2. Give an example of a metabolic poison used to study solute transport.
3. Choose the correct alternative: _____ protein is the peripheral protein in maltose transport. (Mal K, Mal F, Lam B pore)
4. State true or false: Active transport is an exergonic process.
5. Give an example of a mechanosensitive channel in *E coli.*
6. Name one class of proteins in the cell membrane.
7. Name any one solute to which the lipid bilayer of membrane is permeable.
8. Write the full form of ABC transporter.
9. Name the binding protein in maltose transport
10. Give an example of a metabolic process which yields energy for primary active transport.
11. Give an example of iron chelator in *E coli*
12. Give an example of solute transported by facilitated diffusion.

Q. II. A. Answer the following (Attempt any two) [12]

1. Explain biochemical anatomy of mitochondria with the help of a labelled diagram.
2. Schematically represent pattern of electron flow in *E.coli* under aerobic and anaerobic conditions.
3. Discuss the role of end product efflux in generation of electrochemical gradient.
4. Explain the mechanism of ATP synthesis as proposed by Paul Boyer.

Q.II. B. Do as directed (Attempt any eight) [08]

1. Synthesis of ATP from PEP is an example of oxidative phosphorylation. State true or false.
2. Give an example of bacteria which emits visible light.
3. State any one function of proton motive force.
4. Choose the correct alternative and rewrite the statement.
   NAD^+- linked dehydrogenases remove_____ from their substrates. (one hydrogen atom, two hydrogen atoms)
5. Name the electron carriers with characteristic strong absorption of visible light.
6. Each coupling site is also a site for ATP synthesis.in ETC. State true or false.

7. Give an example of inhibitor of electron transfer through ETC.
8. Write any one subunit of Fo complex of mitochondrial ATPase.
9. Name an organism which uses oxalate- formate exchange for generation of energy.
10. Name the purple chromophore associated with bacteriorhodopsin.
11. What is the maximum possible number of ATP synthesis sites in ETC of *Azotobacter vinelandii?*
12. State any one significance of bioluminescent bacteria

Q. III. A. Answer the following (Attempt any two) **[12]**

1. Discuss how biochemical mutants are an important tool to study biosynthesis.
2. Discuss the glycogen molecule and schematically explain its breakdown.
3. With the help of chemical structure, enzymes, cofactors/coenzymes represent oxidation of acetyl CoA to Succinic acid through the TCA cycle.
4. i) With the help of chemical structure, enzymes, cofactors/coenzymes represent dissimilation of Glucose-6-phosphate to Glyceraldehyde-3-phosphate and pyruvate by ED pathway. [4]
   ii) Schematically represent conversion of Galactose-1-phosphate to Glucose-1-phosphate. [2]

Q. III. B. Do as directed (Attempt any eight) **[08]**

1. What products are formed when maltose phosphorylase acts on maltose?
2. Define sequential induction.
3. Erythrose-4-phosphate is required for shikimic acid pathway. State True/False.
4. When glucose labelled with ^{14}C in C1, C3 & C4 is added to a cell suspension and radioactivity is released faster from C4 & C3, then the organism is said to use ____ pathway for its Glucose dissimilation.
5. Name any one coenzyme required in the reaction catalyzed by PDH complex
6. Name the endproduct of the oxidative arm of Incomplete TCA cycle.
7. Give word equation for the reaction catalyzed by malate synthase.
8. Name one pathway that plays an amphibolic role.
9. Name the TCA intermediate that finds use in synthesis of porphyrins.
10. Name a metabolic poison used as a probe to study metabolism.
11. Sucrose is hydrolyzed by amylase. State true or false.
12. Write a word equation for the reaction catalyzed by fumarate reductase

Q. IV. A. Answer the following (Attempt any two) **[12]**

1. Schematically represent propionic acid fermentation by succinate-propionate pathway.
2. Define sugar nucleotide and explain its properties with respect to anabolism.
3. Using structures and enzymes write n-butanol formation during butanol-acetone fermentation.

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5. What is gluconeogenesis? Explain its uniqueness in comparison to glycolysis.

Q. IV. B. Do as directed (Attempt any eight) **[08]**

1. Name an enzyme reducing acetaldehyde to ethanol.
2. Which fermentation is carried out by Enterobacter?
3. State true or false: Glucose-6-Phosphate is a precursor for peptidoglycan synthesis.
4. Write full form of ETF.
5. Write any one function of glycogenin?
6. Name the cellular component containing lipid.
7. Which enzyme catalyzes conversion of Acetyl phosphate to Acetate with net synthesis of ATP?
8. Give the chemical structure of L-Malic Acid
9. Define phosphoketolase
10. Name the glycosidic bond present in peptidoglycan.
11. How does Cycloserine inhibit peptidoglycan synthesis?
12. Name the metabolic intermediate: CH_2=CH-CO~SCoA

Q. V. Answer the following (Attempt any four) **[20]**

1. Write a short note on Histidine transport.
2. Compare and contrast bacterial and mitochondrial ETC. (One point of comparison and four points of contrast)
3. Give five differentiating points between EMP and HMP.
4. What are anaplerotic reactions? State their significance. Give any three anaplerotic reactions.
5. Write a note on Fe-S proteins as component of ETC.
6. Schematically represent Mixed acid fermentation.

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