

N.B. (1) Attempt **all** questions.

(2) **Do not** write any explanation for labelled diagram and schematic representation questions.

Q. 1. A. Answer the following (Attempt any two) 10 marks

- a) Schematically represent the various types of membrane transport that occur in *E coli*.
- b) Write a short note on Active transport in bacteria.
- c) Discuss role of cell membrane with respect to phospholipids, proteins and permeability.
- d) Briefly explain the ATP-binding cassette transporters.

Q. 1. B. Do as directed (Attempt any five) 5 marks

- a) Name a nonspecific protein component of PTS.
- b) Define liposomes.
- c) Give an example of a non-metabolisable solute used to study solute transport.
- d) Define leader peptide.
- e) Give the significance of aquaporins
- f) Write one characteristic feature of solute transport by facilitated diffusion.
- g) Name any one category of transporters.
- h) Give one example of solute transported by binding protein system.
- i) Name the class of proteins embedded in membranes.
- j) Give the significance of Na⁺K⁺ ATPase.

Q. 2. A. Answer the following (Attempt any two) 10 marks

- a) Write a short note on cytochromes of Mitochondrial ETC and bacterial cells
- b) Briefly discuss the different modes of generating electrochemical energy.
- c) Write a short note on Bioluminescence- its chemistry of emission and importance.
- d) Briefly explain the mechanism of synthesizing energy by rotational catalysis.

Q. 2. B. Do as directed (Attempt any five) 5 marks

- a) Define coupling site
- b) What product is obtained when ribityl is phosphorylated at its 5'-OH?
- c) Name a respiratory carrier that exists as a protein-complexed carrier.
- d) Name a terminal acceptor in an anaerobic respiratory chain.
- e) Give the significance of uncouplers.
- f) Give an example of an aerobic bacterium having a branched respiratory chain.
- g) List any one component present in the mitochondrial matrix.
- h) What is the other name for Complex III of mitochondrial ETC?
- i) Define redox potential.
- j) Name the lipid molecule in quinones that contributes to its solubility.

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- Q. 3. A. Answer the following (**Attempt any two**) **10 marks**
- Discuss metabolism of *E-coli* while growing on Acetate as sole source of carbon and energy.
 - Using chemical structures and enzymes write conversion of D-glucose to 3-PGALD and Pyruvic acid via ED Pathway.
 - Using word equations discuss action of PDH complex.
 - How would you use Radiorespirometry to differentiate between EMP and ED Pathway?
- Q. 3. B. Do as directed (**Attempt any five**) **5 marks**
- How many molecules of ATP are synthesized when a molecule of Glucose is fermented to Lactic acid?
 - Name an enzyme cleaving α (1 \rightarrow 6) glycosidic bond in Glycogen.
 - Using word equation give the action of Sucrose phosphorylase.
 - Name the compound formed when two glucose molecules are bonded to each other by α (1 \rightarrow 4) glycosidic bond.
 - Define Amphibolic Pathway.
 - Give any one significance of HMP Pathway.
 - Give chemical structure of OAA.
 - Name a membrane bound enzyme of TCA cycle.
 - Define Cellobiase.
 - Name an end product of reductive branch of incomplete TCA.
- Q.4.A Answer the following. (**Attempt any Two**) **10 marks**
- Schematically represent lactic acid fermentation by Homofermentative pathway.
 - Discuss peptidoglycan biosynthesis with respect to transfer of precursor molecules across the membrane and their polymerization.
 - Discuss the three irreversible reactions of Gluconeogenesis.
 - With the help of chemical structures and enzymes show conversion of acetoacetyl CoA to butanol and acetone by *Clostridium acetobutylicum*.
- Q. 4. B. Do as directed (**Attempt any five**) **5 marks**
- Write word equation to show the reaction catalyzed by Fructose-6- phosphate phosphoketolase.
 - Give one example of MR negative VP positive organism.
 - Define Pasteur effect.
 - Name the enzyme which catalyzes conversion of butyryl Co A to butyryl phosphate.
 - Give one example of heterofermenting lactic acid bacteria.
 - 'A mutase interconverts R methylmalonyl CoA to S methylmalonyl CoA'
State whether true or false.
 - Name the primer used in glycogen biosynthesis.
 - Give example of a bacterium which uses ED pathway for alcohol fermentation.
 - Name any one pathway used by bacteria for propionic acid fermentation.
 - How many ATPs are generated from two molecules of glucose via bifidum pathway?

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Q. 5. Answer the following (**Attempt any three**)

15 marks

- a) Discuss mechanism of Group translocation in bacteria.
- b) Schematically represent : i) Iron uptake in bacteria ii) Protein export in bacteria.
- c) Describe Substrate –level and Oxidative phosphorylation as mechanisms of ATP synthesis.
- d) Discuss action of various enzymes during Starch catabolism.
- e) Using balance sheet calculate the number of ATP synthesized when a molecule of Acetyl CoA is catabolized via TCA cycle.
- f) Schematically represent mixed acid fermentation.
