

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

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

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

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

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

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

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

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

[Turn over

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.
