

2015

MICROBIOLOGY – HONOURS

Third Paper

(Group – B)

Full Marks – 50

The figures in the margin indicate full marks

Candidates are required to give their answers in their own words as far as practicable

Answer **Question No. 1** and **any four** questions from the rest

1. (a) What is turnover number of enzyme ?
(b) Write the names of the enzymes in the pyruvate dehydrogenase complex.
(c) What happens to a cell when treated with oligomycin ?
(d) Compare hexokinase and glucokinase.
(e) What reaction involves Vitamin B12 in the oxidation of odd carbon fatty acids ? 2×5

2. (a) Write down the role of glutamate dehydrogenase in the process of deamination. 2
(b) How is urea cycle regulated ? 3
(c) What are the sources of nitrogen and carbon for the formation of urea during urea cycle ? 3
(d) What is the function of carnitine in fatty acid oxidation? 2

3. (a) What is the function of cofactors like tetrahydrofolate and pyridoxal phosphate in the catabolism of glycine ? 3
(b) Which vitamins play important role in amino acid catabolism ? 2
(c) Write down the step of glycolysis where substrate level phosphorylation occurs. 3
(d) What happens if an individual lacks the enzyme 'lactase' ? 2

4. (a) How enzyme activity is affected by temperature ? 2
(b) What do you mean by covalent activation of enzyme ? 2
(c) What do you mean by specific activity of an enzyme ? 2
(d) What are homotropic and heterotropic regulators of allosteric enzyme ? 2
(e) Mention the importance of NADPH in metabolism. 2

[Turn Over]

5. (a) Explain regulation of metabolic pathways by covalent modification of enzymes using three different examples. 3
- (b) Describe the fate of pyruvate formed in glycolysis during aerobic and anaerobic conditions. 2+2
- (c) What is the significance of active site in enzymatic reactions? 1
- (d) Mention the role of CO_2 as electron acceptors in anaerobic respiration. 2
6. (a) Explain how ribonucleotides are reduced. 2
- (b) Mention the role of aspartate in pyrimidine biosynthesis. 2
- (c) What is the utility of fermentation in anaerobic microorganism? $1\frac{1}{2}$
Write a short note on lactic acid fermentation. $2\frac{1}{2}$
- (d) Mention two differences between cyanobacterial photosynthesis and Green bacterial photosynthesis. 2
7. (a) What are the sources of carbon and nitrogen in the ring of pyrimidine base? 2
- (b) Define uncoupler and give one example. 2
- (c) Explain the effect of arsenic compound on pyruvate metabolism. 2
- (d) Write down the carbondioxide producing reaction of TCA cycle. 2
- (e) Mention two differences between oxidative phosphorylation and bacterial photosynthesis. 2
8. (a) Why people deficient in the enzyme glucose-6-phosphate dehydrogenase are resistant to malaria? 3
- (b) What is the importance of glyoxylate cycle in plants? 2
- (c) Explain the importance of non-oxidative phase of pentose phosphate pathway. 3
- (d) Name a bacterium that follows –
- (i) Both homolactic and heterolactic acid fermentation
- (ii) Both mixed acid and butanediol fermentation. (one name for each case). 2
9. (a) What is standard transformed Gibbs free energy change? 2
- (b) How protein motive force (PMF) is generated along mitochondrial inner membrane? 4
- (c) What are the enzymatic steps required for the oxidation of mono unsaturated fatty acids that are not required in case of saturated fatty acids? 2
- (d) Give examples of bacteria that utilize SO_4 as electron acceptor. 2