2018

MICROBIOLOGY

[Honours]

PAPER —II

Full Marks : 90

Time : 4 hours

The figures in the right-hand margin indicate marks

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

Illustrate the answers wherever necessary

GROUP — A

Answer any **two** questions :   15 × 2

1. Write down the second and third law of thermodynamics. Explain first order and zero order reactions with examples. Differentiate between osmosis and reverse osmosis. Write a note about the different

hazardous effects of radioactive isotopes in living system. What is the pH 10^{-8}(M) HCl ?

$$4 + (1 + 1) + (1 + 1) + 4 + 3$$

2. "Under normal physiological conditions, the bulk of phenylalanine in human is converted to tryosine"– Write down the corresponding equation indicating the enzyme responsible for catalyzing this reaction. Describe urea cycle and mention its significance. Give brief account of expenditure of high energy phosphate in urea formation, mentioning the relevant reaction. Differentiate between ammonification and transamination with suitable example.

$$3 + (3 + 2) + 3 + (2 + 2)$$

3. Schematically represent the pathway of glycogenolysis and state its significance. Discuss different steps of Glyoxalate cycle. Distinguish between Glyoxalate cycle and TCA cycle.

$$(6 + 2) + 4 + 3$$

4. A double stranded DNA contains 15% adenine. Determine the percentage of cytosine present in that particular DNA. How does GC% in DNA affect the T_m value ? State the functions of different arms and loops of t-RNA. Explain Co-enzyme with

example. Why linear transformation of Michaelis-Menten equation was made ? Write a short note on bacterial pathosynthetic pigments. State the significance of ED pathway.

$$2 + 2 + (1 + 1) + (1 + 1) + 2 + 3 + 2$$

GROUP – B

Answer any five questions from the following : 8 × 5

5. Write in brief about the different types of non-covalent bonds that help in proper folding of DNA and proteins. Differentiate between exergonic and endergonic reactions with example. 4 + (2 + 2)

6. Describe the physiological significance of buffer. Write a short note on physico-chemical properties of water. 4 + 4

7. Write the name of different enzymes involved in different steps of β-oxidation of fatty acid. State the role of carnitine shuttle in fatty acid catabolism. 4 + 4

8. Give the difference between oxidative phosphorylation and substrate level phosphorylation. Discuss the proton motive force in the light of chemiosmotic hypothesis. (2 + 2) + 4

9. Lactose is reducing sugar but sucrose is non-reducing sugar – explain. Draw Haworth projections for glucose and fructose. $4 + (2 + 2)$

10. Write down the effects of competitive inhibitors on enzyme kinetics with special emphasis on K_m and V_{max}. What is allosteric enzyme ? Cite one example. $5 + 2 + 1$

11. Distinguish between peptide bond and amide bond. Give the difference between α-helix and β-pleated sheet. $4 + 4$

12. Write down the steps of biosynthesis of pyrimidine through salvage pathway. What are uncouplers ? Cite one example. $5 + (2 + 1)$

GROUP – C

Answer any **five** of the following : 4×5

13. Write down the principle and applications of ion-exchange chromatography. $2 + 2$

14. RNA is alkali-sensitive but DNA is not – explain. 4

15. What do you mean by non-protein amino-acid. Cite one example. State the role of disulfite bond in protein folding. $(1 + 1) + 2$

16. Differentiate between PUFA and MUFA with example. What is the role of SDS in SDS-PAGE ?
$$\left(1\frac{1}{2} + 1\frac{1}{2}\right) + 1$$

17. Write the salient features of Z-DNA. What is Svedberg unit ? $3 + 1$

18. What do you mean by glycerophospholipid and sphingolipid ? $2 + 2$

19. How many ATP can be generated by complete oxidation of glucose in acrobic and anaerobic conditions. Mention the relevant steps. $(1 + 1) + 2$

20. Describe the electrical properties of colloid. 4