2018

(April)

BIOTECHNOLOGY

(Honours)

(Biological Chemistry)

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer Question No. **1**, which is compulsory and *any* **four** from the rest

1. *(a)* What positive role does entropy play in biological processes? 1

(b) Write the structures of α-D-Glucopyranose, α-D-Fructofuranose and β-D-Ribofuranose. 1+1+1=3

(c) An enzyme cannot alter the equilibrium of a chemical reaction but will accelerate its attainment. Substantiate this statement. 5

(d) Define enzyme turnover number and elucidate its significance. 3

2. (a) The ion product of water is the basis of the pH scale. Justify this statement. 7

(b) Calculate the pH of an aqueous solution of 0·3 *M* acetic acid and 0·5 *M* sodium acetate. The pK_a of acetic acid is 4·76. 4

3. (a) How does the selectivity filter of K^+ channels work? 5

(b) Explain the role of K^+ channels in maintaining membrane potential. 4

(c) Define resting membrane potential. 2

4. (a) Write the structures of the following amino acids along with their single letter codes : L-alanine, L-glutamic acid, L-lysine and L-phenylalanine. 2×4=8

(b) What are the characteristics of the peptide bond? 3

5. (a) Explain with the help of suitable examples the distinctions between the terms fatty acids, fats and lipids. 6

(b) What are the structural features of the ATP molecule that determine high standard free energy of hydrolysis of the *r*-phosphate group? 5

(Continued)

6. (a) The vitamin niacin is component of a coenzyme that has an essential role in oxidative phosphorylation. Name the coenzyme and explain its role. 5

(b) Describe the pathway that generates NADPH in animal cells. 6

7. (a) Explain how the light-dependent electron flow in plant chloroplasts results in generation of ATP. 8

(b) What is the fate of pyruvate in alcoholic fermentation? 3

8. (a) What is photorespiration? Why is it considered a wasteful process? 5+1=6

(b) How do C4 plants prevent photorespiration? 5

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