

2018

CBCS

3rd Semester

BIOTECHNOLOGY

PAPER—C7T

(Honours)

Full Marks : 40

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

Chemistry-I
(Physical Chemistry)

1. Answer any five questions : 5×2

- (a) What are the condition(s) for a reaction to occur spontaneously ? 2

- (b) In thermodynamics, when is process called reversible? 2
- (c) Solve the following : 2
- $${}^4_2\text{He} + {}^9_4\text{Be} \rightarrow {}^{12}_6\text{C} + x$$
- (d) What is radiocarbon dating? 2
- (e) Why is bromine liquid at room temperature while fluorine is a gas? 2
- (f) What is the relation between the concentration and activity of an electrolyte solution? 2
- (g) Why is alternate current used in measuring the conductance of an electrolyte solution? 2
- (h) Write down the Arrhenius equation describing the relations between the temperature and reaction rate. 2
2. Answer any *four* questions : 4×5
- (a) Mathematically prove that the work done in a reversible process is maximum. 5

- (b) What do you mean by the following : 1×5
- (i) Cyclic process
 - (ii) isothermal process
 - (iii) adiabatic process
 - (iv) closed system
 - (v) open system
- (c) Write Michaelis Menten equation for an enzyme catalyzed reaction. 5
- (d) Describe the variation in the electrical conductance when an HCl solution is titrated with NaOH solution. 5
- (e) Briefly describe the different uses of isotopes in the field of biology. 5
- (f) (i) The dipole moment of chlorobenzene is 1.55 d.
- The bond distance C_6H_5-Cl is 2.8 \AA . Estimate the ionic character of the bond.

- (ii) Graphically show the effect of temperature on bacterial population growth of a bacterial colony.

3 + 2

3. Answer any one question :

1 × 10

- (a) Describe the third law of thermodynamics. Write down the Vant Hoff equation. Carbon dioxide molecule has zero dipole moment whereas water molecule has a fairly large dipole moment— Explain.

What are the basic differences between a chemical change and a radioactive change? 2 + 2 + 3 + 3

- (b) Why is paradinitrobenzene is non polar but para dihydroxybenzene has a dipole moment 1.64 d ?

What is the Lineweaver - Burk plot in enzyme catalysis ?

Molar conductance of Li^+ ion is lower than Na^+ ion although its ionic radius is smaller—Explain. What is a carnot engine ? 2 + 2 + 3 + 3