

2019

B.Sc.

3rd Semester Examination

BIOTECHNOLOGY
(Honours)

Paper - C 7-T

Chemistry-I
(Physical Chemistry)

Full Marks : 40

Time : 2 Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

1. Answer any five questions : 2×5=10
- (a) Classify the following properties as extensive or intensive : 2
density, entropy, heat capacity, temperature
- (b) Give example of process where 2
- (i) $\Delta G < 0, \Delta S < 0$
- (ii) $\Delta G = 0, \Delta S > 0$
- (c) Why helium gas is obtained in radioactive mines? 2

[Turn Over]

- (d) Define zero order reaction with an example. 2
- (e) p-dichloro benzene is nonpolar but p-dihydroxy benzene is polar. Explain. 2
- (f) Which indicator is used in the titration of weak acid by a strong base and why? 2
- (g) Define London force of attraction. 2
- (h) Calculate the pH of a 10^{-4} (M) NaOH solution at 25°C . 2

2. Answer any *four* questions : 5×4=20

- (a) Define reversible process. One mole of an ideal gas is expanded from 5 litre to 20 litre at 27°C under isothermal condition. Calculate the work done in this process. 2+3
- (b) State the law of radioactive decay. Calculate the no of α - and β -particles decayed during the following change : ${}_{92}\text{U}^{238} \rightarrow {}_{82}\text{Pb}^{206}$ 2+3
- (c) Distinguish between the order and molecularity of a reaction. What are the characteristics of a first order reaction. $2\frac{1}{2}+2\frac{1}{2}$
- (d) (i) Boiling point of o-nitrophenol is less than that of p-nitrophenol. Explain. 2

(ii) The dipole moment of H_2O is 1.84 debye. Calculate HOH bond angle, given H-O bond moment=1.5 debye. 3

(e) Define buffer solution.

10 c.c. of 0.2 (N) NaOH is added to 30 c.c. 0.1 (N) CH_3COOH . Calculate the pH of the resulting solution. pK_a for $CH_3COOH = 4.74$. 2+3

(g) (i) A heat engine cannot be 100% efficient. Explain. 2

(ii) Explain Donnan equilibrium with example. 3

3. Answer any *one* questions : 10×1=10

(a) (i) Write Arrhenius equation of rate constant. How activation energy of a reaction is obtained from this equation? 1+3

(ii) Write notes on artificial radioactivity or radiocarbon dating. 3

(iii) Define molar conductance. What is its SI unit? 2+1

(b) (i) Derive the condition of maximum buffer capacity of an acidic buffer. 4

[Turn Over]

- (ii) Distinguish between nuclear fission and nuclear fusion with suitable example. 3

- (iii) State Planck-Kelvin and Clausius statement regarding the second law of thermodynamics. 3