UG Odd Semester (CBCS) Exam., December—2016

B.Sc (Honours) B.Ed

CHEMISTRY

(7th Semester)

Course No. : BSCH–702

(Physical Chemistry)

Full Marks : 50
Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

1. *(a)* State and explain Carnot theorem. How can the efficiency of a heat engine be increased? 4

(b) Prove that in a reversible process, net entropy change for the system and surrounding is zero. 3

(c) Prove that $\frac{(G/T)}{(I/T)}$ is a state function. 3

OR

2. *(a)* Establish the criteria for feasibility of a process in terms of entropy and enthalpy change. 6

(b) The normal boiling point of water is 100 °C. Its vapour pressure at 80 °C is 0·4672 atmosphere. Calculate the enthalpy of vaporisation per mole of water. 4

3. *(a)* Calculate the free energy change G_{mixing} in the ideal mixing of pure constituents. Also show that in the process S_{mixing} 0 and H_{mixing} 0. 6

(b) How does free energy (G) vary with temperature and pressure? 4

OR

4. *(a)* Show that adiabatic process is isentropic process. 3

(b) Derive Maxwell's relation

$$\left(\frac{dS}{dP}\right)_T \qquad \left(\frac{dV}{dT}\right)_P$$ 4

(c) Define bond order and write its significance. 3

5. *(a)* Define equivalent conductance and write its unit. 2

(b) Write the mathematical form of cell constant. How is cell constant determined? 2

(c) The resistance of 0·01 (*N*) NaCl solution at 298 K is 200 ohm. Cell constant of the conductivity cell is unity. Calculate specific conductance and equivalent conductance. 4

(d) What is the effect of dilution on specific conductance and equivalent conductance? 2

OR

6. *(a)* Discuss the variation of conductivity with concentration of strong electrolytes. 4

(b) Calculate molar conductance of NH_4OH from the following data : 4

$\overset{\circ}{}_m$ for $Ba(OH)_2$ 457 6 ohm $^{1}cm^{2}mol^{1}$

$\overset{\circ}{}_m$ for $BaCl_2$ 240 6 ohm $^{1}cm^{2}mol^{1}$

$\overset{\circ}{}_m$ for NH_4Cl 129 8 ohm $^{1}cm^{2}mol^{1}$

(c) Show that the sum of transport numbers of cation and anion is unity. 2

7. *(a)* Write differences between thermal reaction and photochemical reaction. 3

(b) Write the Lambert law of transmission of light. 2

(c) Describe photolysis of acetone. 2

(d) A 0·003 (*M*) solution of $[Co(NH_3)_6]^3$ transmits 75% of incident light of 500 m if the path length is 1 cm. Calculate the extinction coefficient and percent absorption for a 0·01(*M*) solution. 3

OR

8. *(a)* State and explain Grotthus law of photochemistry. 3

(b) For the photochemical reaction *A* *B*, 1 0 10^5 moles of *B* were formed on absorption of $6{\cdot}0\times10^7$ ergs at 3600 Å. Calculate the quantum efficiency. (*N* 6 02 10^{23}, *h* 6 0 10^{27} erg sec, *C* 3 10^{10} cm / sec.) 4

(c) What are the reasons for very high and very low quantum yield in photochemical reaction? 3

9. *(a)* What is an emulsion? What are different types of emulsion? How do you differentiate between them? 5

(b) What is the cause of stability of colloidal solution? Give the charges on various colloidal particles. 5

OR

10. *(a)* Write differences between colloidal solution and suspension. 3

(b) Classify colloidal solution on the basis of solvent affinity. 3

(c) Define Tyndall effect. 2

(d) Define gold number and write its significance. 2

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