Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 09

B.Sc.(BT) (2013 to 2017)   (Sem.–2)
PHYSICAL CHEMISTRY
Subject Code : BSBT-106
M.Code : 47012

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTION TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

   a. Which colligative property is used to find molecular masses of polymers? Why?

   b. Explain why equimolar solutions of NaCl and sugar do not have the same osmotic pressure.

   c. What is the effect on the enthalpy of a reaction on addition of a catalyst?

   d. Does the rate of reaction remain constant throughout the reaction? Why?

   e. Why is the triple point of water different from normal melting point of ice?

   f. What type of systems are represented by lines, points and areas in one component system?

   g. Which of the following properties are intensive?

   Entropy, Temperature, Volume, Pressure, Enthalpy.

   h. What is the thermodynamic basis of Hess's law?

   i. Is it possible to construct a reversible heat engine of unit efficiency? Give reason.

   j. Under what conditions do ΔA and ΔG become equal to each other?

SECTION-B

2. Derive an expression for work done, internal energy and heat absorbed in an isothermal reversible expansion of an ideal gas.

3. Draw and discuss the phase diagram of water system.

4. Calculate the disintegration constant of a radioactive substance whose half life period is 100 seconds. How much time will it take for 90% decay?

5. Derive an expression for second order rate constant involving one reactant only. What is the half life period of such a reaction?

6. The vapour pressure of water is 17.51 mm. Lowering of vapour pressure of sugar solution is 0.0641mm. Calculate relative lowering of vapour pressure and mole fraction of water.

SECTION-C

7. What is Nernst Heat Theorem? How is the third law of thermodynamics derived from it? State the third law. How is it used to evaluate absolute entropies?

8. What do you understand by elevation in boiling point? Thermodynamically derive an expression for relationship between elevation in boiling point and molality. Hence define molal elevation constant.

9. a. Calculate enthalpy of formation of methane, given that enthalpies of combustion of methane, carbon and hydrogen –890.2kJ, –393.4/kJ and –285.7kJ respectively.

    b. Calculate enthalpy of combustion of ethylene gas to form CO_2 and H_2O, given that enthalpies of formation of ethylene (C_2H_4), CO_2 and H_2O are + 52.3kJ, – 393.7/kJ and –241.8/kJ respectively.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.