D 2 199 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2011

(CCSS)

Chemistry—Core Course—WI

CH 5B 11—PHYSICAL CHEMISTRY—II

Time : Three Hours Maximum Weightage : 30

I. Answer *all* the twelve questions. Each question carries a weightage of 1/4. This section contained Multiple Choice, Fill in the blanks and One word answer type questions :

1 Co-ordination number of an atom in bcc unit cell is _____

2 Give an example for a system with upper CST.

3 Among the following which is isotropic ?

(a) Glass. (b) Rhombic sulphur.

(c) Monoclinic sulphur. (d) None of these.

4 Measurement of which colligative property is preferred in the determination of molecular mass of polymers.

5 The number of normal modes of vibration for water molecule is _____

6 To which point group does benzene belong ?

7 The amount of state required to prepare 10 litres of decimolar solution is :

(a) 0.1 mole. (b) 1 mole.

(c) 10 mole. (d) 0.01 mole.

8 The order of symmetry for C_3, point group is _____

9 Maximum degree of freedom for a one component system is :

(O 1. (b) 2.

(c) 3. (d) 0.

10 Give an example for an aqueous emulsion.

11 Which of the following is microwave active ?

(a) O_2. (b) N_2.

(c) H_2. (d) HCl.

2 How many kinds of protons are there in $C_6H_6NO_2$?

x ¼ = 3 weightage)

II. Answer *all* the nine questions. Each question carries 1 weightage :

13 State the law of rationality of indices.

14 Write the principle of steam distillation.

15 Define improper axis of rotation.

Turn over

16 What is the approximate molecular mass of NaCl determined by measuring the elevation of boiling point of its aqueous solution ?

17 What are the different symmetry elements implied by C_9 axis ?

18 Suggest any *two* differences between Lyophilic sols and Lyophobic sols.

19 State Hardy-Schulze rule.

20 State Franck-Condon principle.

21 What are Stokes and anti-Stokes lines ?

(9 x 1 = 9 weightage)

III. Answer any *five* questions. Each question carries 2 weightage :

22 A metallic element has fcc structure, each edge of unit cell is 288 pm. The density of metal is 7.20 g. cm. $^{-3}$ Calculate the number of unit cells and also the number of atoms in 100 g. of the metal.

23 Construct group multiplication table for water molecule.

24 Draw vapour pressure - composition curves and boiling temperature - composition curves of ethanol - water system. Indicate their main features.

25 Give a brief account of electrical properties of colloids.

26 Calculate the force constant of HCl molecule from the following data :

Fundamental vibrational frequency of HCl is 2890 $cm.^{-1}$ The atomic masses are $^{1}H = 1.673 \times 10^{-27}$ kg. and $^{35}C1 = 58.06 \times 10^{-27}$ kg.

27 What are the conditions to be satisfied by a mathematical group ?

28 Outline the principles of IR spectroscopy. How is it helpful in the identification of characteristic groups ?

(5 x 2 = 10 weightage)

IV. Answer any *two* questions. Each question carries 4 weightage :

29 (a) Write Bragg equation. Explain the terms.

(b) Discuss the powder method of crystal study.

30 (a) 1 m. aqueous solution of glucose boils at 100.52° C. and freezes at – 1.86° C. If an aqueous solution of urea boils at 100.26° C., what will be the freezing point of the urea solution ?

(b) What are ideal and non-ideal solutions ?

31 (a) Draw the phase diagram of water system. Discuss its main features.

(b) What is eutectic point ? Give an example for a simple eutectic system.

(2 x 4 = 8 weightage)