FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, OCTOBER 2012

(CCSS)

CH 5B 11—PHYSICAL CHEMISTRY—II

Time : Three Hours   Maximum Weightage : 30

I. Answer all the *twelve* questions. Each question carries a weightage of ¼. This Section contains multiple choice, fill in the blanks and one word answer type questions.

1. For fcc, co-ordination number is —————

2. Give an example for a two component system forming compound with congruent melting point.

3. Packing efficiency in a crystal with hcp structure is :

    (a) 74%.   (b) 68%.

    (c) 52.4%.   (d) None of these.

4. Write the name or formula of a perfect artificial semipermeable membrane.

5. The number of moles of NaCl in 3 litres of 3M solution of Na Cl is —————

6. The concept of multilayer adsorption is applicable to which of the following adsorption isotherms.

    (a) BET.   (b) Freundlich.

    (c) Gibbs.   (d) Langmuir.

7. Which is the principal axis of symmetry of benzene molecule ?

8. The order of symmetry of C_{zn} point group is ——————

9. Maximum number of phases that can be in equilibrium for a one component system is —————

10. Who devised ultramicroscope ?

11. Which of the following is microwave inactive ?

    (a) N_2.   (b) CO.

    (c) HCl.   (d) H_2O.

12. How many kinds of protons are there in $CH_3 — CH = CH_2$?

                                    (12 x ¼ = 3 weightage)

II. Answer all the *nine* questions. Each carries a weightage of **1.**

13. What are Miller Indices ?

14. Calculate the relative lowering of vapour pressure of 0.1 M aqueous solution of glucose.

15. Find the percentage of urea is an aqueous solution which is isotonic with a 3% aqueous solution of glucose.

16. Suggest any *two* applications of ESR spectroscopy.

17. Define gold number.

Turn over

18. What are stokes and antistokes lines ?

19. What are the advantages of using TMS as reference compound in NMR spectrogy ?

20. Define "Conjugate Solutions" and "CST".

21. How does charge originate in colloidal particles ?

x 1 = 9 weightage)

III. Answer any *five* questions. Each carries a weightage of 2.

22. What are Liquid Crystals ? What are the different types ? Give one example for each.

23. Construct group multiplication table for C_{2v} point group.

24. Equal masses of methanol and ethanol are mixed together. Find the molefraction and mole percent of each.

25. Draw the phase diagram for water system. Briefly discuss its important features.

26. Write BET equation. Explain the terms. Suggest any one application of it.

27. Calculate the fundamental vibrational frequency of HCL in cm⁻¹ from the following data. Force constant of HCL is 483 N m^{-1}. The atomic masses are 'H = 1.673 x 10^{-27} kg CL = 58.06 x 10^{-27} kg.

28. Indicate the normal modes of vibration for CO_2 and H_2O molecules.

(5 x 2 = 10 weightage)

IV. Answer any *two* questions. Each carries a weightage of 4.

29. What are point defects ? Give a brief account of different types of point defects found in crystals.

30. (a) Calculate the molarity (M) and molality *(m)* of a 15% aqueous solution of H_2SO_4 by mass. Density of H_2SO_4 solution is 1.10 g/ml.

(b) Absolute alcohol can't be prepared from rectified spirit by fractional distillation. Explain the reason.

31. (a) What are the conditions to be satisfied by a mathematical group ?

(b) What are the different symmetry elements implied by C_6 axis ?

(2 x 4 = 8 weightage)