STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted during the academic year 2004–05 & thereafter)
SUBJECT CODE: CH/MC/PC54
B.Sc. DEGREE EXAMINATION, NOVEMBER 2009
BRANCH IV- CHEMISTRY
FIFTH SEMESTER
REG.NO ……..

COURSE : MAJOR CORE
PAPER : PHYSICAL CHEMISTRY-II
TIME : 30 MINUTES **MAX.MARKS : 30**

SECTION – A (30x1=30)
ANSWER ON THE QUESTION PAPER ITSELF.

Answer all the questions.

I. Choose the correct answer:

1. The planes which will be absent in simple cubic system is
   a) 100 b) 200 c) 111 d) 110

2. The Structure of KCl as determined by X- ray studies is
   a) Simple Cubic b) BCC c) FCC d) Rhombic

3. In a face centered cubic lattice the number of nearest neighbours for a given Lattice point is
   a) 6 b) 8 c) 12 d) 14

4. which of the following has a diamond –like structure?
   a) ZnS b) CaF_2 c) LiCl d) 14

5. The point in the pressure-temperature curve of a water system where the equilibria.
   Ice ⇌ water ⇌ vapour
   exists is called the
   a) Critical point b) Triple point c) Transtition point d) Eutectic point

6. There can not be a quadruple point on a phase diagram for a one component system because, the number of degrees of freedom is
   a) 3 b) 4 c) -1 d) 0

7. The temperature at which a compound melts into a liquid of the same compositions as the solid is called the
   a) Congruent melting point b) incongruent melting point
   c) peritectic temperature d) Meta stable point

8. Which of the following will have the highest boiling point at one atmospheric pressure?
   a) 0.1m solution of commonsalt b) 0.1m solution of KCl.
   c) 0.1 m solution of sucrose d) 0.1m solution of Baricum chloride.

9. The molality of a solution containing 18g of fructose (molar mass 180) in 500g of water is
   a) 1m b) 0.5m c) 0.2m d) 0.25m

10. The law which relates the solubility of a gas to its pressure is called.
    a) Raoult's law b) The distribution law c) Henry's law d) Ostwald's law

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II. State True or False:

11. There are three tetrahedral voids per atom in a crystal.
12. The incongruent melting point is also called the peritectic point.
13. Cooling of liquids below their freezing point is called super cooling.
14. Partially miscible liquids are completely miscible at their boiling temperature.
15. Mixture of any two liquids is azeotropic.

III. Fill in the blanks:

16. There are _____distinct type of space lattices.
17. Arrangement of atoms in a crystal that leaves a minimum empty space and uses the available space most efficiently is called _____.
18. For a system of two miscible components, the eutectic point exist only at a _____ temperature.
19. The solubility of a gas in a liquid _____ with increase in pressure over the solution at a given temperature.
20. In the phase diagram of sulphur, there are _____ triple points.

IV. Match the following:

21. Cubic	graphite
22.Tetragonal	$CuSO_4 .5H_2O$
23.Triclinic	Diamond
24.Monoclinic	White tin
25.Hexagonal	$Na_2SO_4.10H_2O$

V. Answer in one or two lines.

26. How many Na^+ & Cl^- ions are there in the unit cell of $NaCl$?

27. How many planes, axes and centers of symmetry are there in a cube?

28. State reduced phase rule.

29. What is reverse osmosis?

30. Define CST.

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TIME : 2½ HOURS **MAX.MARKS : 70**

SECTION – B (5x6=30)

Answer any five questions:

1. Define the following
   1) Point group 2) plane of symmetry 3) centre of symmetry

2. Derive the Bragg's law of X-ray diffraction.

3. (a) Draw the following planes
   1. (100) 2. (110) (3) 111 (3)
   (b) What is polymorphism? Give example. (3)

4. The density of LiF is 2.601gcm^{-3}.The (111) first order reflection in the X-ray diffraction from LiF occurs at 8^{o}44'. When X-ray of wave length 70.8pm are used. If there are four LiF molecules per unit cell, calculate Avogadro's number. LiF crystallizes in the cubic system Li = 6.939, F= 18.998.

5. Discuss the significance of the phase rule in Pattinson's process.

6. Derive Nernst's Distribution Law.

7. What is steam distillation? What conditions should be fulfilled by the liquids for carrying out steam distillation? Give the experimental details of the process.

SECTION-C

Answer any two questions: (2X20 = 40)

8. a) What are liquid crystals? Discuss the various types and mention any two applications. (2+8+2)
   b) Write a short notes on neutron diffraction studies & its applications (8)

9. a) Give an account of the structure of ZnS. Differentiate between the two structures. (8)
   b) Differentiate structures of diamond and graphite. (6)
   c) What are the three fundamental laws of crystallography. (6)

10. a) Derive phase rule? Explain terms involved in it. (6+6)
    b) Write notes on i) Freezing mixture.
    ii) Azeotropic distillation (4+4)

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11. a) State and explain Henry's Law. What are its limitations? (5)

b) Define molal depressions constant.

Derive thermodynamically an expression connecting the freezing point depression with the mole fraction of the dissolved solute.

How is this expression utilized in the determination of molecular weight of a non-volatile solute? (2+8+2)

c) Define the Vant-Hoff factor. (3)