STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted during the academic year 2011–12 & thereafter)

SUBJECT CODE: 11CH/MC/PC54

B.Sc. DEGREE EXAMINATION, NOVEMBER 2014
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. An ideal solution is one in which
   (i) $\Delta V=0$ (ii) ΔV = +ve (iii) ΔV=-ve (iv) None of the above

2. CST of phenol water system ---------- on adding a solution of KCl.
   (i) decreases (ii) increases (iii) no change (iv) increases and then decreases

3. Unit of Kb is
   (i) K kg mol (ii) K kg mol^{-1} (iii) Kkg^{-1} mol (iv) kg K^{-1} mol^{-1}

4. Association factor of benzoic acid is
   (i) 2 (ii) 3 (iii) 4 (iv) none

5. Diamond is an example of
   (i) molecular crystal (ii) Covalent crystal
   (iii) ionic crystal (iv) metallic crystal

6. Fluorite has ---------- coordination
   (i) 6:6 (ii) 4:4 (iii) 8:4 (iv) 6:3

7. Number of symmetry elements in NaCl crystal is
   (i) 9 (ii) 13 (iii) 23 (iv) 40

8. Which of the following liquid pairs show a positive deviation from Raoult's law?
   (i) H_2O – HCl (ii) H_2O– HNO_3 (iii) Acetone – $CHCl_3$ (iv) benzene – methanol

9. Close packing is maximum in the ---------- lattice type.
   (i) Bcc (ii) Primitive cube (iii) fcc (iv) closed layer packing

10. Molarity of 2N H_2SO_4 is
    (i) 1M (ii) 2M (iii) 3M (iv) 4M

..2

II. Fill in the blanks:

11. Gibbs-Duhem-Margules equation is ----------.
12. Amorphous substances are ----------.
13. Colligative properties are applicable for ----------.
14. Inter planar distance in crystal is given by --------.
15. p – azoxyanisole is ---------- type of crystal.
16. Relative lowering of vapour pressure is equal to mole fraction of ----------.
17. Solutions having same osmotic pressure are called as ---------- liquids.
18. Every solution behaves ideally at ----------.
19. Bragg's equation is ----------.
20. Boiling point of a solution is ---------- than that of pure solvent.

III. State whether True or False:

21. Naphthalene melts at $85^{o}C$.
22. Vapour pressure of high boiling liquid is higher than that of low boiling liquid.
23. Triethylamine-water system has a lower CST.
24. In a solution solvent obeys Raoult's law and solute obeys Henry's law.
25. Trouton's rule is $(\Delta H \text{ vap}/T) = 88 \text{ J mol}^{-1} \text{ K}^{-1}$.

IV. Answer in a line or two:

26. Define – partition coefficient.

27. What are molecular crystals?

28. Name the methods of purification of pyridine and poly vinyl alcohol.

29. State the conditions for the validity of distribution law.

30. Calculate the Miller indices of the crystal planes which cut through the crystal axes at (a,b,c) and (2a,-3b,-3c).

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COURSE : MAJOR CORE
PAPER : PHYSICAL CHEMISTRY-II
TIME : 2½ HOURS **MAX.MARKS : 70**

SECTION – B **(5x6=30)**

Answer any FIVE questions:

1. (a) Differentiate – crystalline and amorphous solids. (3)
   (b) Calculate the coordination number of an atom in
   (i) primitive cubic unit cell (ii) bcc unit cell (iii) fcc unit cell (3)

2. Explain the structure of CsCl.

3. Explain the phase diagram of a simple eutectic system with example.

4. Derive the relation between the boiling point elevation of a solution and the mole fraction of dissolved solute.

5. Explain CST of (i) Nicotine –water system (ii) Phenol-water system.

6. Mention the applications of Nernst distribution law.

7. Explain – cubic close packing and hexagonal close packing.

SECTION-C

Answer any TWO questions: **(2X20 = 40)**

8. (a) Discuss the theory of steam distillation.
   (b) Write notes on efflorescence and deliquescence.
   (c) What are Miller indices? Draw (111) and (100) planes. (10+5+5)

9. (a) What are liquid crystals? How are they classified? Discuss any two types.
   (b) Derive – Phase rule.
   (c) State and explain Raoult's law and Henry's law. (10+5+5)

10. (a) Draw and discuss the vapour pressure – composition curves of completely miscible binary solution.
    (b) Discuss the phase diagram of sulphur system.
    (c) Write a note on freezing mixtures. (5+10+5)

11. (a) The molar heat of vapourisation of water at $100^{o}C$ is 40.585 kJ mol^{-1}. At what temperature will a solution containing 10 g of glucose per 1000 g of water boil?
    (b) Describe the powder method of X- ray scattering.
    (c) What are azeotropes? Explain azeotropic distillation. (5+7+8)