B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2016
SEMESTER V – CORE COURSE (CHEMISTRY)
CHE5SM - STATES OF MATTER

Time: Three Hours   **Maximum Marks: 60**

PART A

I.   Answer all questions. Each question carries 1 mark.

1.   Define anisotropy.
2.   What is a unit cell?
3.   What do you meant by centre of symmetry?
4.   What is the law of equipartition of energy?
5.   Why are rain drops spherical?
6.   Define the principle of corresponding state.
7.   If a b c and = = =90º, name the crystal system.
8.   Write the expression for the average velocity of a gas molecule.

                                                              (8x1=8)

PART B

II.   Answer any six questions. Each question carries 2 marks.

9.   Calculate the temperature at which the average velocity of Oxygen equals that of hydrogen at 20 K.
10. What is meant by mean free path? Write an expression for the mean free path.
11. Explain types of inter molecular forces that are existed in liquid state of C_2H_5OH and C_6H_6.
12. Why ice has density less than that of water?
13. Calculate the miller indices of a crystal (2a, b, -3c)
14. What are Weiss indices?
15. What is the law of constancy of interfacial angles?
16. Name the point group to which CH_4 belongs and also write its symmetry elements.
17. Define and explain symmetry element S_n.
18. How many v are possessed by water molecule? Show them in a diagram.

                                                              (6x2 = 12)

PART C

III.   Answer any four questions. Each question carries 4 marks.

19. Differentiate D_{2d} and D_{2h} point groups with an example each.
20. Iron (II) oxide, FeO crystal has a cubic structure and each edge of the unit cell is 500 pm. Taking density of the oxide as 4000 Kg cm^{-3}, calculate the number of Fe^{2+} and O^{2-} ions present in each unit cell.
21. Derive an expression for Langmuir adsorption isotherm.
22. Derive Van der Waal's equation.
23. Define critical constants. Explain one method for the liquefaction of gases.

24. Define viscosity. Describe measurement of viscosity usingOstwald Viscometer.

(4x4= 16)

PART D

IV. Answer any two questions. Each question carries 12 marks.

25. a)Draw and explain the PV isotherms of CO_2
    b) Discuss the compressibility factor of real gases
26. a) Describe Maxwell's distribution of molecular velocities.
    b) What is BET equation? Explain the terms involved. At 0^oC and 1 atm pressure, the volume of nitrogen gas required to cover a sample of silica gel, assuming Langmuir monolayer adsorption is found to be 130cm^3 g^{-1} of the gel. Calculate the surface area per gram of silica gel. Given that the area occupied by a nitrogen molecule is 0.162 (nm)^2.
27. What are liquid crystals?.How are they classified?. Explain each of them? What are the important applications?
28. a) Derive Bragg's equation for X-ray diffraction.
    b) Discuss powder method for crystal structure determination.

(2x12 = 24)