Reg. No…….. Name……

B.Sc. DEGREE END SEMESTER EXAMINATION OCTOBER 2017

SEMESTER **–5: CHEMISTRY (CORE COURSE)**

COURSE: **15U5CRCHE07 - : PHYSICAL CHEMISTRY - I**

(For Regular 2015 admission)

Time: Three Hours Max. Marks: 60

SECTION A

(Answer ***all*** questions, each question carries **1** mark)

1. The distance between the centers of two gas molecules at the point of closest approach to each other is called the ----------.
2. What do you mean by rms and most probable velocity?
3. What is viscosity of a liquid?
4. Which among the following molecules does not have a centre of symmetry?
   a) C_6H_6 b)N_2 c)BF_3 d)C_2H_4
5. What is the difference between symmetry element and symmetry operation?
6. What are Miller indices?
7. Define the terms adsorbent and adsorbate.
8. State Raoult's law. (1 x 8 = 8 Marks)

SECTION B

(Answer **any *six*** questions, each question carries **2** marks)

9. The mean free path of the molecule of a gas at 300K is 2.6 x 10^{-5}m. The collision diameter of the molecule is 0.26nm. Calculate the pressure of the gas.
10. What is reverse osmosis? How is it used for desalination of water?
11. Which are the elements combined in C_{2v} point group? Give one example of a molecule with this point group.
12. Differentiate between proper and improper axis of rotation.
13. What is a space lattice and unit cell?
14. Discuss any two factors which influence the adsorption of gas on a solid.
15. Write BET equation and explain the various terms.
16. State the law of equipartition of energy. (2 x 6 = 12 Marks)

SECTION C

(Answer **any *four*** questions, each question carries **5** marks)

17. What are the postulates of kinetic molecular theory of gases?
18. Discuss the symmetry of NH_3 molecule.
19. Derive the Langmuir adsorption isotherm.
20. Discuss the capillary rise method to determine surface tension of a liquid. Calculate the height to which water will rise in a glass capillary having radius of 0.02cm. The surface tension of water is 72.8 dynes cm^{-1}.
21. Differentiate inter and intramolecular Hydrogen bonding with suitable examples.
22. What are azeotropes? Explain with examples. (5 x 4 = 20 Marks)

SECTION D

(Answer **any *two*** questions, each question carries **10** marks)

23. a) Derive the Virial equation of state and get an expression for Boyle temperature in terms of Vander Waals constants.
    b) Calculate the temperature at which the RMS velocity of hydrogen molecule is 10^3m sec^{-1}. Given M= 0.002 Kg mol^{-1} .
24. Derive the Bragg's equation and show how the structure of sodium chloride is established by Bragg's method.
25. a) Discuss the classification of liquid crystals.
    b) Discuss the symmetry of benzene molecule.
26. Write briefly on different types of defects in crystals. (10 x 2 = 20)

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