First Semester B.Sc. Degree Examination, November/December 2019

(CBCS – Semester Scheme – Freshers & Repeaters – 2018-19 onwards)

Paper I - CHEMISTRY – I

Time : 3 Hours]

[Max. Marks : 70

Instructions to Candidates :

1) The question paper has Two Parts. Answer both Parts.

2) Draw diagrams and write chemical equations wherever necessary.

PART – A

Answer any **EIGHT** of the following questions. Each question carries **2** marks :

$$(8 \times 2 = 16)$$

1. Differentiate $\sqrt{x}$ w.r.t x.

2. State the Law of corresponding states.

3. Define collision number and collision frequency of gas molecules.

4. State Stark-Einstein Law of Photochemistry.

5. What is phosphorescence? Give an example.

6. Give the principle of solvent extraction.

7. What is an azeotropic mixture? Give an example.

8. Explain geometrical isomerism with an example.

9. What are chalcogens? Give their general outer electronic configuration.

10. Define equivalent weight of an oxidizing agent.

11. What is Corey-House reaction? Give an example.

12. Give one method of preparation of cyclobutane.

PART – B

Answer any **NINE** of the following questions. Each question carries **6** marks :

$(9 \times 6 = 54)$

13. (a) Explain Andrew's isotherms of carbon dioxide.

(b) Calculate RMS velocity of NO_2 at 303 K. Given that molar mass of $NO_2 = 46 \times 10^{-3}$ kg mol^{-1} and R = 8.314 JK^{-1} mol^{-1}. **(4 + 2)**

14. (a) Describe the Landsberger method of determining Molar mass of a solute.

(b) State Nernst Distribution Law. **(4 + 2)**

15. (a) Describe Cagniard de La Tour's method of determining critical temperature and critical pressure of a gas.

(b) Write Maxwell-Boltzmann distribution law for a mole of a gas and explain the terms. **(4 + 2)**

16. (a) Find :

(i) $\dfrac{d}{dx}\left(\dfrac{1}{x}\right)$

(ii) $\int x \, dx$.

(b) Write expressions for Van Der Waals constants a and b in terms of critical constants. **(4 + 2)**

17. (a) Define surface tension of a liquid and explain the effect of any two factors on it.

(b) A solution containing 2.5×10^{-3} kg of a non-volatile substance in 25×10^{-3} kg of water shows an elevation in boiling point of 0.8 k. Calculate the molar mass of the substance (k_b for water = 0.52 k kg mol^{-1}) **(4 + 2)**

18. (a) Define the term electron affinity. How does it vary across a period in the periodic table? Justify your answer.

(b) What is diagonal relationship? Give one example. **(4 + 2)**

19. (a) Define equivalent mass of an acid. Calculate the equivalent mass of sulphuric acid (atomic masses : H = 1, S = 32 and 0 = 16)

(b) How many significant figures are there in :

(i) 525.256

(ii) 0.0024. **(4 + 2)**

20. (a) Give any four differences between photo chemical and thermal reactions.

    (b) Give the principle involved in steam distillation.   **(4 + 2)**

21. (a) Discuss any two properties each for halide and oxides of alkaline earth metals.

    (b) The size of an anion is always larger than that of the corresponding atom. Why?   **(4 + 2)**

22. (a) What is ozonolysis? Explain its mechanism.

    (b) Name two important conformations of cyclohexane and draw their structures.   **(4 + 2)**

23. (a) Discuss any two factors which affect ionization energy.

    (b) Calculate the angle strain in cyclopentane.   **(4 + 2)**

24. (a) (i) What are elimination reactions? Give one example.

        (ii) Define a chiral centre. Give one example of a molecule containing a chiral centre.

    (b) Classify the following into electrophiles and nucleophiles :

        (i) NH_3 (ii) $AlCl_3$

        (iii) NO_2^+ (iv) Cl^-.   **(4 + 2)**

25. (a) Draw Newmann projection formulae of n-butane and compare their stability.

    (b) How is an alkene prepared by Wittig reaction?   **(4 + 2)**

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