

III Semester B.Sc. Examination, November/December 2014  
(Old Scheme)  
(Prior to 2012-13 )  
CHEMISTRY – III

Max. Marks : 60

Time : 3 Hours

**Instruction :** The question paper has **two** Parts. Answer **both** the Parts.

## PART – A

Answer **any six** of the following questions. **Each** question carries **two** marks. (6×2=12)

1. Define most probable velocity of a gas.
2. Calculate rms velocity of SO<sub>2</sub> at 127°C. Molecular weight of SO<sub>2</sub> = 64 × 10<sup>-3</sup> Kg Mol<sup>-1</sup>,  
R = 8.314 × 10<sup>-3</sup> KJ k<sup>-1</sup> Mol<sup>-1</sup>.
3. Write any two differences between inorganic polymers and organic polymers.
4. What is Ellingham diagram ?
5. Write the principle of vapour phase refining.
6. Zn<sup>+2</sup> ion is colourless. Why ?
7. Give an example for esterification reaction.
8. State II law of thermodynamics.
9. Define efficiency of a heat engine.
10. What is a zero order reaction ? Give one example.

## PART – B

Answer **any eight** of the following questions. **Each** question carries **eight** marks. (8×6 = 48)

- a) Applying Maxwell-Boltzmann Law derive an expression for the most probable velocity of a gas.
- b) Most probable velocity of carbon monoxide at 273 K is 403 ms<sup>-1</sup>. Calculate its rms velocity at 273 K. (4+2)
- a) Explain Cagniard de La Tour's method of determining critical temperature and critical pressure of a gas.
- b) Define Mean free path of molecules in a gas. (4+2)



13. a) What are silicones ? Write a method of preparation of silicones.  
 b) What is Teflon ? Write its partial structure. (4 2)
14. a) Compare d block and f block elements with respect to  
 1) Oxidation states. 2) Formation of complex compounds.  
 b) What are interstitial compounds ? Give examples. (4 2)
15. a) Explain Mond's process of refining Nickel metal.  
 b) Explain Goldschmidt-Alumino Thermite Process. (3+3)
16. a) Write the IUPAC names of  
 1)  $\begin{array}{c} \text{OH} \\ | \\ \text{CH}_3 - \text{C} - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$  2)  $\begin{array}{c} \text{H}_2\text{C} - \text{CH} - \text{CH}_2 \\ | \quad | \quad | \\ \text{OH} \quad \text{OH} \quad \text{OH} \end{array}$
- b) Explain the Lucas test to distinguish between primary, secondary and tertiary alcohols. (2+4)
17. a) Write the reactions involved in the synthesis of glycerol from propylene.  
 b) Write the mechanism of Kolbe's reaction of phenol. (3+3)
18. a) Starting from Grignard reagent write the preparation of  
 1) Isopropyl alcohol. 2) Acetaldehyde.  
 b) Write Williamson's ether synthesis. (4 2)
19. a) Derive the relation  $\Delta G^\circ = -RT \ln K_p$ .  
 b) State Nernst Heat Theorem. (4 2)
20. a) What is a spontaneous process ? Give an example. What is the criterion for the spontaneity of a process in terms of free energy change ?  
 b) Calculate the efficiency of Carnot's heat engine working between the temperatures 400 K and 300 K. (4 2)
21. a) Derive an expression for the rate constant of a II order reaction for equal concentrations of reactants [when  $a = b$ ].  
 b) Define energy of activation of a reaction. (4 2)
22. a) A first order is 20% completed in 20 minutes. Calculate its  
 1) Rate constant. 2) Half-life period.  
 b) Give two examples for II order reactions. (4 2)