

Roll No. ....

**053/A**

Total No. of Questions : 26 ]

[Total No. of Printed Pages : 4

**SS  
2067**

**ANNUAL EXAMINATION SYSTEM  
CHEMISTRY (Theory)  
(Common for Science & Agriculture Groups)  
(English Version)  
(Evening Session)**

Time allowed : Three hours

Maximum marks : 70

- Note :**
- (i) You must write the subject-code/paper-code **053/A** in the box provided on the title page of your answer-book.
  - (ii) Make sure that the answer-book contains 30 pages (including title page) and are properly serialed as soon as you receive it.
  - (iii) Question/s attempted after leaving blank page/s in the answer-book would not be evaluated.
  - (iv) Log tables may be asked for if needed.
  - (v) Use of simple calculator is allowed.
  - (vi) Marks allotted to each question are indicated against it.
  - (vii) **All questions are compulsory.**
  - (viii) The paper comprises of 26 questions. Attempt total 26 questions. Internal choice is given in Q. No. **22, 23, 24, 25 and 26.**
  - (ix) Question No. **1 to 8** carry one mark each. Answer in one line.
  - (x) Question No. **9 to 16** will be of two marks each. They are short answer type questions.
  - (xi) Question No. **17 to 23** will be of 4 marks each.
  - (xii) Question No. **24, 25 and 26** (Three questions) will be of 6 marks each. Full internal choice is given.

**All questions are compulsory.**

1. State Raoult's law for solutions containing volatile liquids. 1
2. Write the units of rate constant for first order reaction. 1
3. Why are alcohols comparatively more soluble in water than the corresponding hydrocarbons ? 1

4. Write a chemical test to distinguish between formaldehyde and acetaldehyde. 1
5. What happens when benzene diazonium salt is treated with copper cyanide dissolved in aqueous KCN? 1
6. Draw the pyranose structure of  $\alpha$ -D-glucose. 1
7. Give one example for each of the following :
- (i) An artificial sweetener whose use is limited to cold drinks.  $\frac{1}{2}$
- (ii) A non-ionic detergent.  $\frac{1}{2}$
8. What are tranquillizers? 1
9. Distinguish between tetrahedral void and octahedral void. 1+1
10. The decomposition of hydrogen peroxide in the presence of Iodide ion has been found to be the first order in  $\text{H}_2\text{O}_2$  :
- $$2\text{H}_2\text{O}_2(\text{aq}) \xrightarrow{\text{I}^-(\text{aq})} 2\text{H}_2\text{O}(\text{l}) + \text{O}_2(\text{g})$$
- The rate constant has been found to be  $1.01 \times 10^{-2} \text{ min}^{-1}$ . Calculate the rate of reaction when  $[\text{H}_2\text{O}_2] = 0.4 \text{ mol L}^{-1}$ . 2
11. (a) Write two ores of Aluminium.  $\frac{1}{2} + \frac{1}{2}$
- (b) Define calcination. 1
12. Transition metals are found to be good catalysts. Explain. 2
13. (a) What is the state of hybridisation and geometry in  $[\text{Ni}(\text{CN})_4]^{2-}$ ?  $\frac{1}{2} + \frac{1}{2}$
- (b) Write IUPAC name of  $\text{K}_3[\text{Fe}(\text{CN})_5\text{NO}]$  1
14. Before reacting aniline with  $\text{HNO}_3$  for nitration, it is converted to acetanilide. Why? 2
15. Write two differences between globular and fibrous proteins.  $1 \times 2$  or  $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$
16. (a) Write the name and formula of basic monomer unit of natural rubber.  $\frac{1}{2} + \frac{1}{2}$
- (b) What does PLA stand for? 1

17. (a) The density of chromium metal is  $7.2 \text{ g cm}^{-3}$ . If the unit cell is cube with edge length of 289 pm, determine the type of unit cell.  
(At. mass of Cr = 52 a.m.u.,  $N_0 = 6.02 \times 10^{23} \text{ mol}^{-1}$ ) 3
- (b) The radius of  $\text{Na}^+$  ion is 95 pm and that of  $\text{Cl}^-$  ion is 181 pm. Predict the coordination number of  $\text{Na}^+$  ion. 1
18. (a) Addition of 0.643g of a compound to 43.95g of benzene lowers the freezing point from  $5.51^\circ\text{C}$  to  $5.03^\circ\text{C}$ . If  $K_f$  for benzene is  $5.12 \text{ K kg mol}^{-1}$ , calculate the molar mass of the compound. 2
- (b) A commercially available sample of sulphuric acid is 15%  $\text{H}_2\text{SO}_4$  by weight (density =  $1.10 \text{ gm L}^{-1}$ ). Calculate the molarity of the solution. 2
19. (a)  $\text{H}_3\text{PO}_3$  is diprotic acid. Explain. 2
- (b) Molecular nitrogen is not particularly reactive. Why? 2
20. Give four differences in physisorption and chemisorption. 4
21. Calculate the cell emf and  $\Delta G$  for the cell reaction at  $25^\circ\text{C}$  for the cell :  
 $\text{Zn(s)} \mid \text{Zn}^{2+}_{(0.0004\text{M})} \parallel \text{Cd}^{2+}_{(0.2\text{M})} \mid \text{Cd(s)}$   
 $E^\circ$  values at  $25^\circ\text{C}$  :  $\text{Zn}^{2+} \mid \text{Zn} = -0.763\text{V}$   
 $\text{Cd}^{2+} \mid \text{Cd} = -0.403\text{V}$   
 $F = 96500 \text{ C}$ ,  $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ . 4
22. How do primary, secondary and tertiary alcohols differ in their dehydrogenation reaction with reduced copper at  $573\text{K}$ ? 4
- or
- Explain Victor Meyer's test for primary ( $1^\circ$ ) alcohol. 4
23. (a) Why are the boiling points of carboxylic acids higher than the corresponding alcohols? 3
- (b) How will you convert propanone to propan-2-ol? 1
- or
- (a) Why do aldehydes and ketones have high dipole moments? 3
- (b) How will you convert Benzoyl chloride to Benzaldehyde? 1

( 4 )

24. (a) Why does nitrogen show anomalous behaviour in its group ? 3  
(b) Draw the structure of  $\text{XeF}_4$ . Write its state of hybridisation and preparation. 1+1+1

or

- (a) Draw and explain the labelled flow chart of Haber's process for the manufacture of ammonia. 4  
(b) Why is dioxygen a gas but sulphur a solid ? 2
25. (a) Give three differences between lanthanoids and actinides. 3  
(b) Explain why is  $\text{ScCl}_3$  colourless while  $\text{TiCl}_3$  is coloured ? 3

or

- (a) What are the consequences of lanthanoid contraction ? 3  
(b) How is  $\text{K}_2\text{Cr}_2\text{O}_7$  prepared ? Write chemical equations. 3

26. Write the following reactions :

- (i) Finkelstein reaction  
(ii) Wurtz-Fittig reaction  
(iii) Williamson's synthesis  
(iv) Friedel Craft alkylation  
(v) Gattermann reaction  
(vi) Hunsdiecker reaction 1+1+1+1+1+1

or

- (a) Haloalkanes react with potassium cyanide (KCN) to give alkyl cyanide but gives alkyl isocyanide with silver cyanide ( $\text{AgCN}$ ). Why ? 3  
(b) Haloarenes are insoluble in water but soluble in benzene. Explain. 3