

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 α -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 H_2O_2 :
- $$2H_2O_{2(aq)} \xrightarrow{I^-(aq)} 2H_2O_{(l)} + O_{2(g)}$$
- The rate constant has been found to be $1.01 \times 10^{-2} \text{ min}^{-1}$. Calculate the rate of reaction when $[H_2O_2] = 0.4 \text{ mol L}^{-1}$. 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 $[Ni(CN)_4]^{2-}$? $\frac{1}{2} + \frac{1}{2}$
- (b) Write IUPAC name of $K_3[Fe(CN)_5NO]$ 1
14. Before reacting aniline with HNO_3 for nitration, it is converted to acetanilide. Why? 2
15. Write two differences between globular and fibrous proteins. 1×2 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 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 Na^+ ion is 95 pm and that of Cl^- ion is 181 pm. Predict the coordination number of Na^+ ion. 1
18. (a) Addition of 0.643g of a compound to 43.95g of benzene lowers the freezing point from 5.51°C to 5.03°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% H_2SO_4 by weight (density = 1.10 gm L^{-1}). Calculate the molarity of the solution. 2
19. (a) H_3PO_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 ΔG for the cell reaction at 25°C for the cell :
 $\text{Zn(s)} | \text{Zn}^{2+} (0.0004\text{M}) || \text{Cd}^{2+} (0.2\text{M}) | \text{Cd(s)}$
 E° values at 25°C : $\text{Zn}^{2+} | \text{Zn} = -0.763\text{V}$
 $\text{Cd}^{2+} | \text{Cd} = -0.403\text{V}$
 $F = 96500 \text{ C}$, $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$. 4
22. How do primary, secondary and tertiary alcohols differ in their dehydrogenation reaction with reduced copper at 573K ? 4
- or
- Explain Victor Meyer's test for primary (1°) 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 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 ScCl_3 colourless while 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 (AgCN). Why ? 3
(b) Haloarenes are insoluble in water but soluble in benzene. Explain. 3