

This question paper contains 5 printed pages.

3258

Your Roll No.

B.Tech. (M) / I **J**

Paper III— CHEMISTRY

(EME-103)

Time : 3 hours

Maximum Marks : 70

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

Attempt any five questions.

All questions carry equal marks.

1. (a) Discuss the construction of Quinhydrone electrode and show that it behaves as a form of Hydrogen electrode. 2,2
- (b) Write principle of Potentiometric titration. Describe Potentiometric redox or neutralization titration in detail. 2,4
- (c) A zinc rod is placed in 0.1 M zinc sulphate solution at 298 K. Calculate:
 - (i) Potential of the electrode if
$$E_{Zn}^{\circ +2 \rightarrow Zn} = -0.76 \text{ V.}$$
 - (ii) EMF of the cell when this electrode is coupled with $Cu^{+2} (1.75 \text{ M})/Cu$ electrode

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$E_{\text{Cu}^{+2} \rightarrow \text{Cu}}^{\circ} = -0.34 \text{ V}$. Represent the cell and write net cell reaction also. 2,2

2. (a) Describe the synthesis of a stereospecific polymer. 3

(b) Give name and structure of the appropriate polymers for the following applications (any two):

(i) Non-stick coating

(ii) Wrinkle resistant fibre

(iii) Optical lenses

(iv) Lubricating oil. 5

(c) Write preparation, properties and applications of any two of the following:

(i) Novolac

(ii) Hypalon

(iii) Polycarbonate

(iv) Kevlar. 6

3. (a) Deduce the kinetic equation for a certain reaction,



which is found to be first order with respect to each reactant. 4

- (b) Calculate the difference in activation energies if velocity constant of above reaction is found 10 times in the presence of catalyst at 27°C . 4
- (c) Define velocity of reaction and report its measurement on the basis of collision theory. Explain the influence of temperature and concentration of reactants on velocity of reaction. 6
4. (a) Draw a DTA curve of hydrated calcium oxalate and discuss its salient feature in detail. 3
- (b) With the help of neat block diagram, discuss instrumentation and working of TGA. 4,4
- (c) Which thermal technique will give information about:
- (i) Phase transformations
 - (ii) Drying temperatures
 - (iii) Composition of a mixture. 3
5. (a) Giving an example write informative note on the invariant system. 3
- (b) When various mix. of metal A and metal B in the form of melt were cooled, the following freezing points were observed:

%A	100	90	80	70	60	50	40	30	20	10	0
Freezing point (°C)	240	225	210.5	195	180	166	150	162	175	188	200

(i) Draw Phase diagram. (ii) What is Eutectic temperature? (iii) What is Eutectic composition?

6

(c) State Nernst Distribution Law. Explain its applications in detail.

5

6. (a) Explain in brief (any three):

(i) Applications of IR Spectroscopy

(ii) Precessional Frequency

(iii) Principle of Raman Scattering Spectroscopy

(iv) Origin of X-rays.

9

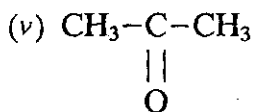
(b) For each of the following compounds predict the number of ^1H NMR signal. Give reason in support of your answer.

(i) $\text{CH}_3\text{-CH}_2\text{-CH}_3$

(ii) $\text{CH}_3\text{-CH}_2\text{-Cl}$

(iii) $\text{CH}_3\text{-CH-CH}_3$
 $\quad\quad\quad |$
 $\quad\quad\quad \text{Cl}$

(iv) $\text{ClCH}_2\text{-CH}_2\text{-CH}_2\text{Cl}$



5

7. (a) Explain any *three* of the following in brief:

(i) Drop Point

(ii) Lubricating Emulsion

(iii) Hydrodynamic Lubrication

(iv) Viscosity Index.

7

(b) What are Solid Lubricants? Giving examples discuss their advantages and action of lubricants.

4

(c) Which type of lubricant is applied for:

(i) Gears

(ii) Refrigerator system?

3

8. Write short notes on any *two* of the following:

(i) UV-Vis Spectroscopy

(ii) Concentration Cell

(iii) Molding of Plastics

(iv) Factors Influencing Adhesive Action

(v) Phase Diagram of $\text{FeCl}_3\text{-H}_2\text{O}$ System.

2×7