*This question paper contains 4 printed pages.*

3308 *Your Roll No.* .....

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

Paper III— CHEMISTRY

(ECE–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.*

*Assume suitable missing data, if any.*

1. (*a*) State Gibb's Phase rule. Write its limitations. 2,2

   (*b*) For two component system, degree of variance is reduced by one. Why? 3

   (*c*) What is Eutectic point? Write its significance. 3

   (*d*) Derive an expression to determine partition co-efficient of a solute, when it dissociates in one of the solvents in two immiscible solvents system (Assume the degree of dissociation is $\alpha$). 4

2. (*a*) Write various steps involved in the polymerization of styrene in the presence of catalytic amount of peroxide. 4

P. T. O.

(*b*) What do you understand by Polydispersity and Average Molecular Mass of a polymer? Explain briefly. 7

(*c*) Write an informative note on co-polymers, giving examples. 3

3. (*a*) Describe Ostwald isolation method for the determination of order of reaction. 4

(*b*) Define temperature co-efficient. For a chemical reaction, temperature co-efficient at 27°C and 37°C was 3·0. Calculate activation energy for the same reaction. 5

(*c*) Derive kinetic equation for second order reaction when both the reactants are taken in equal concentrations. Write unit of the rate constant. 4,1

4. (*a*) What is electrochemical series? Discuss its applications. 2,5

(*b*) Describe the method to determine EMF of a galvanic cell potentiometrically. 4

(*c*) Represent a cell consisting of $Ni/Ni^{+2}$ (1 M) and $Pb/Pb^{+2}$ (1 M) electrodes at 25°C. Write down cell reaction and calculate $E^{\circ}_{cell}$.

$$\left[E^{\circ}_{Ni^{+2}\rightarrow Ni} = 0 \cdot 24 \text{ V};\ E^{\circ}_{Pb^{+2}\rightarrow Pb} = -0 \cdot 13 \text{ V}\right] \quad 3$$

5. (*a*) Which spectroscopic technique will help to determine the following (any *three*)

(*i*) Hydrogen Bonding

(*ii*) Geometry of Molecules

(*iii*) Different kinds of protons in a molecule

(*iv*) Chemical kinetics of fast reactions.

Discuss in brief. 3×3=9

(*b*) Describe various types of fundamental vibrations that can occur in a non-linear molecule. 5

6. (*a*) What do you understand by non-sulfur vulcanization? Discuss with an example. 3

(*b*) What is gutta percha? How is it different from Havea rubber structurally? 2

(*c*) Give preparation, properties and applications of any *three* of the following:

(*i*) Nitrile Rubber

(*ii*) PV Rubber

(*iii*) Hypalon

(*iv*) Neoprene

(*v*) Thiokol. 3×3

7. (*a*) Differentiate DTA and DSC techniques of analysis. 3

(*b*) Giving suitable example, discuss applications of thermogravimetry in determination of the composition of a binary mixture. 4

(*c*) Describe principle and instrumentation involved in enthalpimetric analysis. 7

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

(*i*) Polyamides

(*ii*) Construction and applications of glass electrode

(*iii*) Pseudounimolecular reactions

(*iv*) ESR spectroscopy

(*v*) Gel permeation chromatography (GPC). 14

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