This question paper contains 3 printed pages.]

Your Roll No. .....

8498 **A**

B.Tech. (C)/I

Paper ECE–103—CHEMISTRY

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) Derive Nernst's equation for single electrode potential and discuss the effect of concentration of electrolyte on electrode potential. 7

   (b) Distinguish between a galvanic cell and a concentration cell. 3

   (c) EMF of the following galvanic cell was found to be 0.48 V at 25°C:

   $$Cu \left| \underset{(1M)}{Cu^{+2}} \right| \left| \underset{C=?}{H^{+}} \right| H_2, Pt \; (P = 1 \text{ Atm})$$

   Calculate the pH of unknown solution. Also write the complete cell reaction 4

   (Given : $E^{0}_{Cu^{+2} \rightarrow Cu} = +0.34$ V)

[P.T.O.

2. (a) Explain the following :

(i) Melt of lead-silver alloy containing silver greater than 2.6% is allowed to cool.

(ii) Triple point in water system phase diagram.

(iii) Distribution co-efficient. $3 \times 3 = 9$

(b) State Nernst's Distribution Law. How is it applicable for solvent extraction processes ? 5

3. (a) What do you understand by tacticity of Polymer ? How does it affect the properties of a polymer ? Give a method to synthesize isotactic polypropylene. 10

(b) Differentiate between thermoplastic and thermosetting resins. 4

4. (a) Explain the applications of TGA in analysis of polymeric materials. 5

(b) With the help of neat block diagram, discuss the principle and working of DTA. How is it different from DSC ? 9

5. (a) Define order of reaction. How is it determined by integration method ? When the initial concentration of a reactant is doubled, the time of half-completion for a certain reaction is found to change from 50 seconds to 25 seconds. What is order of reaction ? Also calculate the time taken for the concentration to be reduced to 20% of the initial concentration of 0.50 mol litre $^{-1}$. 9

(b) Using Arrhenius equation derive an expression for determining the activation energy of a chemical reaction. 5

6. (a) Write principle and applications of IR or ESR Spectroscopy. 8

(b) Define chemical shift, equivalent and non-equivalent protons giving examples. 3

(c) How will you distinguish between *n*-butane and iso-butane using HNMR spectroscopy. 3

7. (a) How is vulcanized rubber superior over raw rubber ? Write structural unit of vulcanized rubber. 5

(b) Write preparation, properties and applications of any ***three*** of the following :

PTFE, Nylon 11, PS, Buna-S rubber, Neoprene, PU Rubber. 9

8. Write short notes on any ***three*** of the following : 14

(i) Quinhydrone electrode

(ii) Molecular Mass of Polymer

(iii) Latex Technology

(iv) Pseudounimolecular reaction

(v) Origin of absorption band in UV-VIS spectroscopy

(vi) Phase diagram of a two-component system with congruent melting point.