Reg. No. : | | | | | | | | | | | | |

Question Paper Code: 1011490

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024

First Semester

Aeronautical Engineering

U20CY101 – ENGINEERING CHEMISTRY

(Regulation 2020)

(Common to All Branches)

Time: Three Hours Maximum: 100 Marks

Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. Name the monomers used and write the polymerization reaction for the preparation of Nylon 6, 6.

2. Classify polymers based on their source with one example each.

3. Identify two factors influencing adsorption of solutes from solutions.

4. Choose the more effective catalyst with reason. Platinum as a lump or finely divided platinum.

5. In an isolated system, two ideal gases under same pressure and temperature are allowed to mix. Infer the sign (positive or negative) of entropy change with reason.

6. List the criteria (any two) for spontaneity of a reaction.

7. Define quantum efficiency.

8. Infer the need of AgBr photo sensitizer in photography.

9. Examine the number of phases involved in the given example of decomposition of $CaCO_3$

$$CaCO_3(s) \rightleftharpoons CaO_3(s) + CO_2(g)$$

10. List two advantages of alloys over metals.

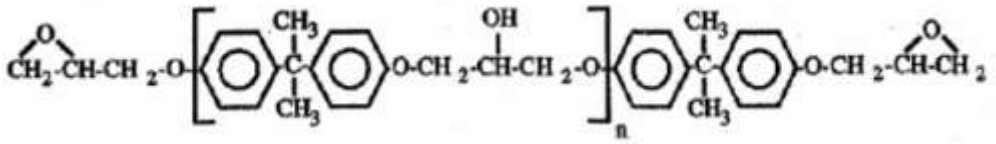
PART – B (5 x 16 = 80 Marks)

11. (a) (i) Choose one example for a thermoplastic and thermosetting plastic and differentiate based on preparation, properties and reactions. (6)

(ii) Compare addition and co-polymerization polymerization in terms of their mechanisms, types of monomers used and products formed. (10)

(OR)

(b) (i) Apply condensation polymerization mechanism to prepare the given polymer. Outline the properties and applications of the prepared polymer. (6)



(ii) You are assigned to prepare polyacrylonitrile. Illustrate four methods from list (bulk, nano, solution, suspension or emulsion polymerization) to prepare the polymers and depict with a neat sketch. (10)

12. (a) Derive an expression for Langmuir adsorption isotherm. Interpret that at normal pressure Langmuir's adsorption isotherm becomes identical with Freundlich's adsorption isotherm. Compare it with high and low pressure with limitations. (16)

(OR)

(b) Identify four characteristics of enzymes to be used in enzyme catalysis. Derive Michaelis-Menten equation for an enzyme catalyzed reaction. (16)

13. (a) (i) Summarize the entropy change in reversible and irreversible processes. (6)
(ii) Explain the concepts of Helmholtz free energy and Gibbs free energy. Describe the relationship between the two. (10)

(OR)

(b) (i) Illustrate and derive Clausius–Clapeyron equation for a system consisting of one mole of substance existing in two phases A and B. (6)
(ii) State Vant Hoff's reaction isotherm. Derive an expression for a reaction isotherm of the general equation.
aA + bB ->cC + dD (10)

14. (a) (i) Compare the photochemical equations of Grotthuss-Draper, Stark-Einstein and Lambert-Beer's law. (8)
(ii) Analyze with a neat sketch the non-radiative and radiative transition that occurs upon absorption of radiation. (8)

(OR)

(b) Indicate the four molecular energy levels where transitions are possible in an organic molecule upon absorption of electromagnetic radiations. Compare and contrast the fundamental differences of IR and UV spectroscopy based on transitions. (16)

15. (a) (i) Construct the phase diagram for the following system and

$$\text{Ice (s)} \rightleftharpoons \text{Water (l)} \rightleftharpoons \text{Vapour (g)}$$

Calculate the number of phases, component and degree of freedom for the given system. (8)

(ii) Interpret the significance of alloying. Explain the properties and uses of nichrome and stainless steel. (8)

(OR)

(b) (i) Construct the phase diagram for a lead-silver system. Explain the number of component and degree of freedom for the given system. (8)

(ii) Explain any four processes of heat treatment of steel. (8)

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