Total No. of printed pages = 6

END SEMESTER EXAMINATION – 2022

Semester : 4th

Branch : Chemical Engineering

Subject Code : Ch-401

APPLIED CHEMISTRY

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

1. *All* questions of PART – A are compulsory.
2. Answer any *five* questions from PART – B.

PART – A

Marks – 25

1. Fill in the blanks : 1×5=5

   (a) Reaction of carboxylic acid and alcohol produces _____.

   (b) _____ is an example of oil in water emulsion.

[Turn over

(c) On dehydration, alcohols produce _____.

(d) Internal energy is a _____ function.

(e) Half-life of _____ order reaction is independent of initial concentration.

2. State True or False : 1×5=5

(a) On dilution, conductivity of a solution increases.

(b) Rate of a reaction is independent of temperature.

(c) Gibbs potential is used to predict the spontaneity of a chemical reaction.

(d) $pH + pOH = 14$.

(e) The size of colloidal particles is less than that of true solution.

3. Choose the correct option : 1×5=5

(a) In an adiabatic process

(i) Temperature remains constant

(ii) Volume remains constant

(iii) Heat remains constant

(iv) Pressure remains constant

(b) Phenols are

(i) Derivatives of benzene

(ii) Aromatic alcohols

(iii) Aromatic carboxylic acid

(iv) Polyhydric alcohols

(c) Which of the following is a nucleophile ?

(i) H_3O^+ (ii) $AlCl_3$

(iii) OH^- (iv) F_2

(d) In emulsion, the dispersed phase and dispersion medium are

(i) Liquid, solid

(ii) Solid, liquid

(iii) Liquid, liquid

(iv) Gas, liquid

(e) Entropy of a spontaneous process

(i) Increases

(ii) Decreases

(iii) Remains same

(iv) May increase and decrease.

4. Answer the following questions in brief : 1×5=5

(a) What is the unit of rate constant of a first order reaction ?

(b) Give one example of a path function.

(c) How is benzene converted to toluene ?

(d) Define Conductance.

(e) What is a Closed system ?

5. Match the following : 1×5=5

(a) Reducing agent	(i) Catayst
(b) Ohm^{-1}	(ii) Alcohol
(c) Fermentation	(iii) Solvent loving colloid
(d) Increases rate of reaction	(iv) Unit of conductance
(e) Lyophillic sol	(v) Aldehyde

PART – B

Marks – 45

6. (a) State the Second law of thermodynamics. 2

   (b) Explain the processes involved in a Carnot cycle. 4

   (c) Distinguish between intensive and extensive properties with examples. 3

7. (a) What is rate of a reaction ? Write the various factors which influence the rate of reaction. 2+3=5

   (b) Give one example of a pseudo first order reaction. 1

   (c) Derive the integrated rate law of 1st order reaction. 3

8. (a) What is common ion effect ? 3

   (b) Find the pH of 0.0001 M KOH. 3

   (c) What is buffer solution ? Give one example of each of acidic and basic buffer. 3

9. (a) Differentiate between physisorption and chemisorption. 2

(b) Write notes on the following : 3×2=6

(i) Tyndall effect

(ii) Dialysis.

(c) Write one difference between true solution and colloidal solution. 1

10. (a) How are the following conversions done ? (give reactions) 1×5=5

(i) Benzene to Phenol

(ii) Methanol to Ethanol

(iii) Acetic acid to methane

(iv) Ethanol to Ethene

(v) Ethanol to Acetic acid.

(b) Write three homologues of Benzene. 3

(c) Write the structure of Adipic acid. 1

11. (a) How is acetic acid produced from primary alcohol ? 2

(b) Write a note on Inductive effect. 3

(c) How is ethyl alcohol manufactured from molasses ? 4