2020-21
Time - 3 hours
Full Marks – 60

*Answer **all groups** as per instructions.*
Figures in the right hand margin indicate marks.
Candidates are required to answer
in their own words as far as practicable.

Group-A

1. Answer <u>all</u> questions or fill in the blanks as required.   [1x8]

   a) Gibb's phase rule for general system is _____.

   b) The point at which all phases can exist in equilibrium is called

      _____.

   c) The substance that is above the temperature and pressure of the

      critical point is called _____.

   d) The rate constant of zero order reaction has the unit _____.

   e) The role of catalyst is to change _____ of reaction.

   f) _____ is used as a catalyst for the reaction $H_2O_2 \rightarrow 2H_2O + O_2$?

   g) For a chemical reaction $A \rightarrow B$, it is found that the rate of reaction

      doubles when the concentration of A is increased four times. The

      order of the reaction is _____.

   h) Extent of physisorption of a gas increases with _____.

Group-B

2. Answer <u>any eight</u> of the following questions within two or three

   sentences each. $[1\frac{1}{2}x8]$

   a) Define phase rule.

   b) On mixing chloroform and acetone, the vapour pressure of the

      solution is less than expected from Raoult's law, why?

   c) Write the characteristics of 1st order reaction.

   d) Define eutectic point.

e) How graphical method helps to determine the order of a re action?

f) What is metastable equilibrium?

g) Define activation energy.

h) What are catalytic poisons?

i) What is the significance of half life?

j) What is meant by positive and negative adsorption?

GROUP-C

3. Write notes on any eight of the followings within 75 words: [2x8]

   a) What are ideal and non-ideal solutions? Explain.

   b) Predict the number of components, phases and degrees of freedom in the following equilibrium system: $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$

   c) What is meant by zero order reaction and give an example of it.

   d) What is the significance of triple point in the phase diagram of water?

   e) Define order and molecularity with examples.

   f) What is Arrhenius equation?

   g) A first order reaction is 50% complete in 100 minutes. How long will take for 90% completion?

   h) Define homogeneous catalysis with example.

   i) Give a relation between half-life period and the order of a re action.

   j) Give any two points of difference between absorption and adsorption.

GROUP- D

4. Answer <u>any four</u> questions within 500 words each.   [6x4]

   a) Derive Clausius- Clapeyron equation for the equilibrium liquid $\rightleftharpoons$vapour. How will you obtain the heat of vapourisation using this equation?

   b) Derive an equation for the rate constant of a second order reaction where the initial concentration of the reactants are different.

   c) State and explain Nernst distribution law and discuss its applications.

d) Derive Duhem-Margule's equation in terms of partial pressures of two components.

e) What is the difference between physical adsorption and chemical adsorption? Explain Freundlich isotherm.

f) What do you understand by complex reactions? Write a note on consecutive reactions.

g) What are the characteristics of catalyst? Give an account of specificity and selectivity in catalysis with examples.

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