Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VI SEMESTER B.TECH. END SEMESTER EXAMINATIONS, MAY2022

SUBJECT: FUNDAMENTALS OF INDUSTRIAL CATALYTIC PROCESS [CHM 4302]

REVISED CREDIT SYSTEM

Time: 3 Hours 23.5.22 MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A.	Derive the relation between the freezing point depression of a solution and the mole fraction of the dissolved solute. How is this expression used for determining the molar mass of a non- volatile solute?	**5**
1B.	Show that osmotic pressure is a colligative property. Explain Berkeley and Hartley's method for the determination of osmotic pressure	**3**
1C.	The freezing point depression of a 1/200 molal solution of sodium sulphate in water was found to be 0.0265°C. Calculate the degree of dissociation of the salt at this concentration (K_f for water = 1.86°)	**2**
2A.	Give a brief account of Zeta potential and explain the origin of charge on colloidal particles with a suitable example	**5**
2B.	Discuss the following applications of colloids: (i) removal of dirt from sewage (ii) Detergent action of soap.	**3**
2C.	Write the preparation of gold sol by condensation and dispersion methods	**2**
3A.	State Henry's law. Show that if in any solution, the solute obeys Henry's law within a certain range of concentration the solvent obeys Raoult's law over the same range of concentration	**5**
3B.	**(i)** A solution containing 4 g of a non volatile organic solute per 100 ml was found to have an osmotic pressure equal to 500 cm of mercury at 27°C. Calculate the molar mass of the solute. **(ii)** The vapour pressure of carbon tetrachloride at 30^0C is 143 mmHg. 0.5 g of a non volatile organic substance of molar mass 65 is dissolved in 100 ml of CCl_4. What would be the vapour pressure of the solution? Density of carbontetrachloride is 1.58gcm^3	**3**
3C.	Distinguish between ideal and non-ideal solution. Give a suitable example for each	**2**
4A.	Write the catalytic cycle for the cobalt catalysed hydroformylation of a terminal alkene and describe individual steps involved.	**5**
4B.	Explain each of the terms - i) Activation by coordination (ii) Activation by addition with reference to molecule activation during catalysis	**3**
4C.	Write four differences between physical adscrption and chemical adsorption	**2**

5A.	List the postulates and discuss in detail the Langmuir adsorption isotherm	**5**
5B.	With proper illustration write a note on tl e different type of adsorption isotherms	**3**
5C.	Give reasons for the following: **(i)**Acetic acid is more strongly adsorbed from aqueous solution than from alcoholic solution. **(ii)** Adsorption is accompanied by decrease in enthalpy as well as decrease in entropy of the system.	**2**

****