Sub Code: BAST101 **ROLL NO……..……..**

Ist SEMESTER EXAMINATION, 2022 – 23

Ist yr B.Tech.

Engineering Chemistry

Duration: 3:00 hrs **Max Marks: 100**

Note: - Attempt all questions. All Questions carry equal marks. In case of any ambiguity or missing data, the same may be assumed and state the assumption made in the answer.

Q 1.	Answer any four parts of the following. a) Give the characteristics of boiler feed water. Differentiate between sludge & scale. b) Discuss the Factors affecting corrosion. c) Explain the conductivity of polymers with conjugated π electron system. How is this conductivity increased by doping? d) Differentiate between anodic and cathodic coating for the prevention of corrosion. e) What are biodegradable polymers? Give the condition required for the polymer to be biodegradable. Discuss their applications? f) Calculate the number of components, phase and degree of freedom for reaction when reaction is going in closed vessel. $3H_2(g)+N_2(g)\leftrightarrow 2NH_3(g)$.	5x4=20
Q 2.	Answer any four parts of the following. a) The coefficient of viscosity of two liquids at 298 K are $1.408 \times 10^{-3} kgm^{-1}s^{-1}$ and $1.594 \times 10^{-3} kgm^{-1}s^{-1}$ and their densities at the same temperature are $8.07 \times 10^{-3} kgm^{-3}$ and $10.17 \times 10^{-3} kgm^{-3}$ respectively. If the time of flow in an Ostwald viscometer for the first liquid is 100 seconds, calculate the time of flow for the second liquid. b) What do you understand by hydrogen bonding? Differentiate type of hydrogen bonding on the basis of IR spectroscopy. c) What is the criteria and selection rule for the molecule to show rotational spectrum? Identify the microwave active molecules among given compounds: HCl, HC≡CH, CO, O_2 and give reason. d) Calculate internuclear distance of CN molecule, if the pure rotational spectrum shows series of equally spaced lines with the interspacing distance 3.8 cm^{-1}. Molar mass of C and N is 12 amu and 14 amu. e) Discuss the various vibrational modes in IR spectroscopy of polyatomic molecules f) Explain Chemical shift, shielding & de-shielding of proton in CH_3Br, CH_3Cl & CH_3I.	5x4=20
Q 3.	Answer any two parts of the following. a) Discuss the electrochemical theory of corrosion along with equations. How much rust ($Fe_2O_3.6H_2O$) can be produced by 5gm of iron? b) What is the principle of IR spectroscopy? One of the fundamental vibrational modes of H_2O occurs at 3652 cm^{-1}. What would be the frequency of the corresponding vibration for D_2O. c) Discuss the principle of Raman Spectroscopy. Also explain how it differs from microwave spectroscopy. Which vibrational mode of CO_2 and H_2O is Raman active?	10x2= 20
Q 4.	Answer any two parts of the following.	10x2= 20

	a) Define Gibbs phase rule. Apply phase rule to water system by drawing well labelled diagram. Explain why one component system cannot have quadruple phase. b) Illustrate the ion exchange process of water softening. Compare its merit over zeolite process. Calculate the hardness of 20000 litres of water which is passed through zeolite softener and after which zeolite bed required 40 litres of 5% NaCl solution. c) Define hardness and give the constituent responsible for temporary and permanent hardness. 1 g of $CaCO_3$ was dissolved in HCl and the solution made up to 500 ml with distilled water. 50ml of the solution required 25 ml of EDTA solution for titration. 25 ml of hard water sample required 20 ml of EDTA and after boiling and filtering required 10ml of EDTA solution. Calculate the temporary, permanent and total hardness in given sample water.	
Q 5.	Answer any two parts of the following. a) Give preparation, properties and application of following polymer: i) Neoprene ii) Terylene iii) Nylon 6,6 iv) Kevlar v) Buna N b) Differentiate between:- (i) Homopolymer and co-polymer (ii) Thermoplastic and Thermosetting polymers c) Define cloud point, pour point and flash point of lubricant. Discuss the classification of lubricants	10x2= 20

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