Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–III EXAMINATION – WINTER 2025

Subject Code:3130506 Date:12-12-2025

Subject Name: Applied Chemistry

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Write a short note on Magnetic Properties of the substances.	**03**
	(b)	Outline the followings: Specific rotation, Optical activity, Diasteromer and Enantiomer.	**04**
	(c)	Show that Depression in freezing point is colligative property. 45 g of ethylene glycol ($C_2H_6O_2$) is mixed with 600 g of water (Given: K_f of water = 1.86 K kg mol^{-1}). Calculate (i) the freezing point depression and (ii) the freezing point of the solution	**07**
Q.2	**(a)**	Explain the fission of a covalent bond.	**03**
	(b)	Summarize the importance of Resonance effect with suitable examples.	**04**
	(c)	What are reactive intermediates? Outline the structure, properties, stability and significance of Carbocations, Carboanion and Carbenes.	**07**
		OR	
	(c)	Discuss the organic reactions mechanisms of Acylation, Nitration, Sulphonation and Alkylation of toluene.	**07**
Q.3	**(a)**	Define wave function and write its significance.	**03**
	(b)	Explain the conformational isomerism in n-butane.	**04**
	(c)	Explain the hybridization, describe the bonding in molecules using hybridization concept (make use of suitable examples).	**07**
		OR	
Q.3	**(a)**	Interpret Heisenberg Uncertainty Principle	**03**
	(b)	Discuss the two methods of resolution of racemic mixtures.	**04**
	(c)	Outline the phase diagram of the Ferric chloride-water system and explain its salient features.	**07**
Q.4	**(a)**	Define: Glass Transition Temperature, Liquid Crystal and viscoelasticity.	**03**
	(b)	The heat of combustion of methane is -890.65kJ mol-1 and heat of formation of CO_2 and H_2O are -395.5kJ mol-1 and 286.0kJ.mol-1 respectively. Calculate the heat of formation of methane. (R=8.314J/K/ mol).	**04**
	(c)	What is the half-life period of a reaction? Derive the equation for first order reaction.	**07**

OR

Q.4	**(a)**	Explain the followings by taking suitable examples. i) Heat of transition *and* ii) Heat of neutralization.	**03**
	(b)	A first order reaction is 10% completed in 20 minutes. How long will it take to be 70% complete?	**04**
	(c)	Explain mathematical expression for the rate constant of the second order reaction.	**07**
Q.5	**(a)**	Write a short note on the Nano Composites.	**03**
	(b)	Write down the properties and uses of insulators.	**04**
	(c)	Explain the principle, instrumentation and applications of SEM.	**07**

OR

Q.5	**(a)**	Write down the properties and uses of Silicates.	**03**
	(b)	Explain the principles of Florescence spectroscopy	**04**
	(c)	Explain the principle, instrumentation and applications of PSA.	**07**

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