Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III EXAMINATION – SUMMER 2025

Subject Code:3130506 Date:29-05-2025

Subject Name: Applied Chemistry

Time:02:30 PM TO 05:00 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)**	Define Viscosity and Normality.	**03**
	(b)	Explain the importance of zeolites in catalysis.	**04**
	(c)	Differentiate between S_N and S_E reactions. Give one example of each.	**07**
Q.2	**(a)**	Explain resonance effect with example.	**03**
	(b)	Explain Beer-Lambert law.	**04**
	(c)	Draw the phase diagram of water and describe in detail.	**07**
		OR	
	(c)	Derive the expression for half-life period of the first order reactions.	**07**
Q.3	**(a)**	How the nematic phase differ from smectic phase.	**03**
	(b)	Suggest a method for resolution of racemic mixture of a base.	**04**
	(c)	What is chirality? Explain the optical isomerism in tartaric acid.	**07**
		OR	
Q.3	**(a)**	List the characteristics of refractories.	**03**
	(b)	Draw molecular orbital diagram of the N_2 molecule.	**04**
	(c)	Predict the shape of H_2O and XeF_4 with the help of VSEPR theory.	**07**
Q.4	**(a)**	State basic principle of Mass spectroscopy.	**03**
	(b)	Describe the Hess's Law of constant heat summation with example.	**04**
	(c)	Explain principle, working and applications of the TEM.	**07**
		OR	
Q.4	**(a)**	Calculate the mole fraction of ethylene glycol (MW=62), if its 3.1 g is dissolved in 18 g of water.	**03**
	(b)	Enthalpy of combustion of carbon to carbon dioxide is –393.5 J/mol. Calculate the heat released upon formation of 44 g of CO_2 from carbon and oxygen gas.	**04**
	(c)	Explain working principle of XRD. List its applications in the chemistry.	**07**
Q.5	**(a)**	Draw structure of R and S isomers of lactic acid.	**03**
	(b)	Explain the stability order of 1^o, 2^o and 3^o carbocation and carbanion species.	**04**
	(c)	Explain: (a) Molecularity of reaction. (b) Glass transition temperature	**07**
		OR	
Q.5	**(a)**	What is Nanocomposite materials?	**03**
	(b)	Explain specific rotation.	**04**
	(c)	Derive Schrödinger wave equation and explain the importance of ψ.	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – SUMMER 2024

Subject Code:3130506 Date:19-07-2024

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)**	Define the followings: Mole Fraction, Normality and Molarity	**03**
	(b)	What is Osmotic pressure? Write the applications of osmotic pressure?	**04**
	(c)	Show that Elevation of Boiling point is colligative properties. How to molecular mass of a substance is calculated using Elevation of Boiling point? Write importance of the Elevation of Boiling point	**07**
Q.2	**(a)**	Summarize the importance of Electron displacement effect.	**03**
	(b)	Define: Specific rotation, Optical activity, Diasteromer and Enantiomer.	**04**
	(c)	Explain the R, S System for Asymmetric Molecules and E, Z System for Geometrical Isomers.	**07**
		OR	
	(c)	Give the type of organic reactions and discuss Nucleophilic aromatic substitution reaction (SN^1).	**07**
Q.3	**(a)**	Define degree of freedom, component and phase	**03**
	(b)	Derive Gibbs phase rule thermodynamically	**04**
	(c)	Explain the Molecular Orbital Theory and discuss it salient features with suitable examples.	**07**
		OR	
Q.3	**(a)**	Describe Heisenberg Uncertainty Principle	**03**
	(b)	Discuss the SP^3 hybridization with suitable examples.	**04**
	(c)	Outline the phase diagram of the one component system and explain its salient features.	**07**
Q.4	**(a)**	Distinguish the order of reaction and molecularity	**03**
	(b)	Enthalpy of combustion of carbon to carbon dioxide is –393.5 J/mol. Calculate the heat released upon formation of 22 g of CO_2 from carbon and oxygen gas.	**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) Internal Energy and ii) Endothermic reaction.	**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 ceramics.	**04**
	(c)	Explain the principle, instrumentation and applications of TEM.	**07**
		OR	
Q.5	**(a)**	Write down the properties and uses of Zeolites.	**03**
	(b)	Explain the principles of Florescence spectroscopy	**04**
	(c)	Explain the principle, instrumentation and applications of NMR.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III(NEW) EXAMINATION – SUMMER 2023

Subject Code:3130506 Date:26-07-2023

Subject Name:Applied Chemistry

Time:02:30 PM TO 05:00 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)**	Define: Dipole moment, Molality, Osmotic pressure.	**03**
	(b)	Define: Optical activity, Specific rotation, Reaction rate, zero order reaction.	**04**
	(c)	Explain the components of scanning electron microscope.	**07**
Q.2	**(a)**	Explain optical Isomerism of Tartaric acid.	**03**
	(b)	Define Term: Parachor, Viscosity, Carbenes, Carbocations.	**04**
	(c)	Give the types of Organic reaction and discuss Electrophilic Addition reaction.	**07**
		OR	
	(c)	Explain the R, S System for Asymmetric Molecules and E, Z System for Geometrical Isomers.	**07**
Q.3	**(a)**	Discuss SP^2 Hybridization with example.	**03**
	(b)	Derive Heisenberg Uncertainty Principle.	**04**
	(c)	Explain the Molecular Orbital Theory.	**07**
		OR	
Q.3	**(a)**	Define x-ray diffraction. Give the application of XRD.	**03**
	(b)	The heat of combustion of ethylene at 17° C and at constant volume is -332.19 kcal. Calculate the heat of combustion at constant pressure considering water to be in liquid state. ($R = 2$ cal degree^{-1} mol^{-1}).	**04**
	(c)	Draw the phase diagram of ferric chloride – water system with its salient features.	**07**
Q.4	**(a)**	Elaborate Pseudo-order reaction with suitable example.	**03**
	(b)	Define: Phase, Eutectic point, heat of neutralization, Exothermic reaction.	**04**
	(c)	Draw the phase diagram of one component system and discuss its salient features.	**07**
		OR	
Q.4	**(a)**	Derive the rate equation for the first order reaction.	**03**
	(b)	Hydrolysis of ethyl acetate by NaOH using equal concentration of the reactants, was studied by titrating 25 ml of the reaction mixture at different time intervals against standard acid. From the data given below, establish that this is a second order reaction.	**04**

Time (minutes)	**0**	**5**	**15**	**25**
ml of acid used	16.0	10.2	6.1	4.3

	(c)	Explain mathematical expression for the rate constant of the second order reaction.	**07**
Q.5	**(a)**	Define: Glass Transition Temperature and Liquid Crystal. What are zeolites?	**03**
	(b)	Discuss the classification of ceramics with their general properties.	**04**
	(c)	Explain the instrumentation of mass spectroscopy.	**07**

OR

Q.5	**(a)**	What are copolymers? Give its uses.	**03**
	(b)	Write a note on refractories with their uses.	**04**
	(c)	Explain the components of Transmission electron microscope.	**07**

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