Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III (New) EXAMINATION – WINTER 2019

Subject Code: 3130506 Date: 28/11/2019

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.**

			Marks
Q.1	**(a)**	Explain condensed system.	**03**
	(b)	Derive Gibbs phase rule thermodynamically.	**04**
	(c)	State the Hess law and illustrate with suitable examples.	**07**
Q.2	**(a)**	Describe: Liquid crystal	**03**
	(b)	Explain principle of Mass spectrometry	**04**
	(c)	Discuss the Phase diagram of Zn-Cd system.	**07**
		OR	
	(c)	Explain concept hybridisation with simple organic molecules	**07**
Q.3	**(a)**	Difference between the terms configuration and conformation.	**03**
	(b)	Derive Schrödinger wave equation.	**04**
	(c)	Discuss stereochemistry of tartaric acid.	**07**
		OR	
Q.3	**(a)**	Discuss the terms carbanion and free radical	**03**
	(b)	Explain mechanism of nucleophilic substitution	**04**
	(c)	Explain recemisation of optical isomers with suitable examples.	**07**
Q.4	**(a)**	Define: Degree of freedom and component	**03**
	(b)	A first order reaction is 10% completed in 20 minutes. How long will it take to be 70% complete?	**04**
	(c)	Explain pseudo order first reaction. Derive the equation for first order reaction.	**07**
		OR	
Q.4	**(a)**	Explain Heisenberg Uncertainty Principle	**03**
	(b)	Discuss the properties of insulators	**04**
	(c)	Discuss Parachor and Explain role of parachor in determining the chemical constitution of a compound	**07**
Q.5	**(a)**	Predict the NMR spectrum of CH_3 .CH_2.OH	**03**
	(b)	The heat of combustion of methane is -890.65kJ mol-1 and heat of formation of CO2 and H2O are -395.5kJ mol-1 and 286.0kJ.mol-1 respectively. Calculate the heat of formation of methane. (R=8.314J/degree.mol)	**04**
	(c)	Name any four important surface characterization techniques and explain any one technique in detail.	**07**
		OR	
Q.5	**(a)**	Define terms : (i) Order of reaction (ii) thermo chemistry	**03**
	(b)	Explain Florescence spectroscopy	**04**
	(c)	Discuss the properties and application of zeolites	**07**

****

Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–III (NEW) EXAMINATION – WINTER 2020

Subject Code:3130506 Date:10/03/2021

Subject Name:Applied Chemistry

Time:10:30 AM TO 12:30 PM Total Marks:56

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			Marks
Q.1	**(a)**	Show the measurement of Boiling point Elevation.	**03**
	(b)	Define: Optical activity & Specific rotation. Order of reaction, Reaction rate.	**04**
	(c)	Explain the principle, instrumentation of Nuclear magnetic resonance spectroscopy.	**07**
Q.2	**(a)**	Explain the R, S System for Asymmetric Molecules.	**03**
	(b)	Define Term: Normality, Viscosity, Carbenes, Homolytic fission.	**04**
	(c)	Give the types of Organic reaction and discuss Nucleophillic Substitution (SN^2) reaction.	**07**
Q.3	**(a)**	Describe Heisenberg Uncertainty Principle	**03**
	(b)	Discuss SP^3 Hybridization with suitable example.	**04**
	(c)	Explain the Molecular Orbital Theory.	**07**
Q.4	**(a)**	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 Zinc-Cadmium system. Describe its importance.	**07**
Q.5	**(a)**	Elaborate zero order reaction with suitable example.	**03**
	(b)	Define: Degree of freedom, Eutectic point, heat of combustion, Endothermic reaction.	**04**
	(c)	Draw the phase diagram of one component system and discuss its salient features.	**07**
Q.6	**(a)**	Discuss Pseudo order reaction.	**03**
	(b)	A solution of H_2O_2 when titrated against $KMnO_4$ solution at different time intervals gave the following results:	**04**

T(minutes)	**0**	**10**	**20**
Vol. of $KMnO_4$ used for 10 ml H_2O_2	23.8 ml	14.7 ml	9.1 ml

Selecting the above data, Show that the decomposition of H_2O_2 is a first order reaction.

	(c)	Explain mathematical expression for the rate constant of the second order reaction.	**07**

Q.7	**(a)**	What is the role of reinforcement in composites?	**03**
	(b)	Discuss the classification of ceramics with their general properties.	**04**
	(c)	Describe the each section of Scanning Electron Microscope.	**07**
Q.8	**(a)**	What are copolymers? Give its uses.	**03**
	(b)	Write a note on refractories with their uses.	**04**
	(c)	Explain with principle, instrumentation of mass spectroscopy.	**07**

****

Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – WINTER 2021

Subject Code:3130506 Date:19-02-2022

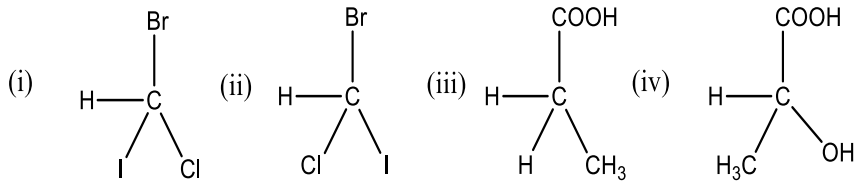
Subject Name:Applied Chemistry

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)**	Explain the mechanism of S_N1(Unimolecular Nucleophilic Substitution) Reaction.	**03**
	(b)	Discuss the SP^2 hybridization with suitable example.	**04**
	(c)	Discuss Parachor and Explain role of Parachor in determining the chemical constitution of a compound.	**07**
Q.2	**(a)**	Define terms: (i) Carbenes (ii) Optical Activity (iii) Covalent bond	**03**
	(b)	Explain the bonding and anti-bonding molecular orbitals and differentiate between them.	**04**
	(c)	Gives the types of Organic reaction and discuss electrophilic aromatic substitution reaction.	**07**
		OR	
	(c)	Draw the phase diagram of one component system and discuss its salient features.	**07**
Q.3	**(a)**	Explain pseudo first order reaction with the help of an example.	**03**
	(b)	The vapor pressure of water at 20^0C is 17.54 mm. When 20 gm. of a nonvolatile solute is dissolved in 100 gm. of water, the vapour pressure is lowered by 0.30 mm what is the molecular weight of substance?	**04**
	(c)	Explain Stereochemistry and discuss the Stereochemistry of Tartaric acid.	**07**
		OR	
Q.3	**(a)**	Explain terms: (i) Carbonium ion (ii) Heat of combustion (iii) Enthalpy	**03**
	(b)	Assign R and S Configuration for each of the following compounds.	**04**



	(c)	Draw the phase diagram of Zn-Cd system. Describe its importance.	**07**
Q.4	**(a)**	Predict the number of signals in the NMR spectrum of (i) CH_3CH_2OH (ii) CH_2Cl-$CHCl_2$ (iii) CH_3-CH_2-CH_3	**03**
	(b)	Write a note on refractories with their uses.	**04**
	(c)	Explain the principle and instrumentation of TEM.	**07**
		OR	

Q.4	**(a)**	What are the basic principles involved in the Nuclear Magnetic Resonance(NMR).	**03**
	(b)	Discuss the properties of insulators..	**04**
	(c)	What are the factors affecting glass transition temperature?	**07**
Q.5	**(a)**	Give the application of Mass spectroscopy.	**03**
	(b)	What is Bomb Calorimeter? Explain the construction of Bomb Calorimeter.	**04**
	(c)	Explain mathematical expression for the rate constant of the second order reaction.	**07**

OR

Q.5	**(a)**	Draw and explain the shape of *p*-orbitals.	**03**
	(b)	A first order reaction takes 40 min for 30% decomposition. Calculate $t_{1/2.}$	**04**
	(c)	State the Hess law and illustrate with suitable examples.	**07**

****

Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – SUMMER 2021

Subject Code:3130506 Date:08/09/2021

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)**	Explain R and S configuration of lactic acid.	**03**
	(b)	Draw a neat schematic diagram of Polari meter and explain how it works?	**04**
	(c)	What do you understand by S_N1 and S_N2 reactions? Explain each one with Suitable illustration.	**07**
Q.2	**(a)**	Write application of X-ray diffractometer in detail.	**03**
	(b)	Explain Beer-Lambert's law.	**04**
	(c)	With a neat diagram explain the working of scanning Electron Microscope(SEM).State its application.	**07**
		OR	
	(c)	Derive Bragg's equation. How is it used to determine the internal crystal structure?	**07**
Q.3	**(a)**	Explain the following: (i) Specific rotation (ii) Free radical (iii) Chiral carbon	**03**
	(b)	Discuss the optical activity and isomerism in tartaric acid.	**04**
	(c)	With a neat diagram explain the working of Transmission Electron Microscope(TEM).State its application.	**07**
		OR	
Q.3	**(a)**	What is Mass spectroscopy? State its application.	**03**
	(b)	Explain with the help of MO theory, the paramagnetic character of oxygen.	**04**
	(c)	State Hess's Law of constant heat, Explain its some important application.	**07**
Q.4	**(a)**	What is the difference between osmosis and diffusion?	**03**
	(b)	Explain bond fission and its type with suitable examples.	**04**
	(c)	Explain the term osmotic pressure. How is the osmotic pressure of a solution is affected by concentration of a solute and by temperature?	**07**
		OR	
Q.4	**(a)**	Explain the relative stability of primary, secondary carbon ions.	**03**
	(b)	Write a note on Racemization and Asymmetrical synthesis.	**04**
	(c)	What do you understand by reaction intermediate? Explain with suitable example.	**07**
Q.5	**(a)**	Derive Gibbs phase rule thermodynamically.	**03**
	(b)	Discuss about conformational isomerism in cyclohexane.	**04**
	(c)	Discuss the main features of the phase diagram of water system, explaining especially why the slope of solid-liquid line is negative for water?	**07**
		OR	
Q.5	**(a)**	What are insulating materials?	**03**
	(b)	What are the physical and chemical properties of refractories?	**04**
	(c)	State the basic raw material used in ceramics and explain how chemical conversion take place?	**07**

****

Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III (NEW) EXAMINATION – SUMMER 2022

Subject Code:3130506 Date:28-07-2022

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 Parachor / Molar Refraction.	**03**
	(b)	What is Optical activity?	**04**
	(c)	What do you understand by S_{N1} and S_{N2} reactions? Explain each one with Suitable illustration.	**07**
Q.2	**(a)**	Define Boiling point/Molality/Molarity	**03**
	(b)	Define Beer-Lambert's law and explain with proper diagram.	**04**
	(c)	Explain the working of NMR Spectroscopy. State its application.	**07**
		OR	
	(c)	Derive Bragg's equation. How is it used to determine the internal crystal structure?	**07**
Q.3	**(a)**	Explain the following: (i) Specific rotation (ii) Free radical (iii) Chiral carbon	**03**
	(b)	Discuss the optical activity in Lactic acid.	**04**
	(c)	With a neat diagram explain the working of Mass specroscopy.State its application	**07**
		OR	
Q.3	**(a)**	What is XRD? State its application.	**03**
	(b)	Explain with the help of MO theory, the paramagnetic character of oxygen.	**04**
	(c)	Explain experimental measurement of heat of reaction.	**07**
Q.4	**(a)**	Write a note on insulators.	**03**
	(b)	Explain glass transition temperature and viscoelasticity.	**04**
	(c)	What do you understand by reaction intermediate? Explain with suitable example.	**07**
		OR	
Q.4	**(a)**	Explain the role of reinforcement-matrix interface.	**03**
	(b)	Explain any one types of organic reaction and mechanism.	**04**
	(c)	Explain the term osmotic pressure. How the osmotic pressure of a solution is affected by concentration of a solute and by temperature?	**07**
Q.5	**(a)**	What are Biomaterials ?	**03**
	(b)	Explain conformational isomerism in cyclohexane.	**04**
	(c)	Write the raw material used in ceramics and explains its chemical conversion.	**07**

OR

Q.5	**(a)**	What is Gibb's phase rule? Explain.	**03**
	(b)	Write the physical and chemical properties of refractories?	**04**
	(c)	What are the main features of the phase diagram of water system, explaining why the slope of solid-liquid line is negative for water?	**07**

****