

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 racemisation 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 $\text{CH}_3 \cdot \text{CH}_2 \cdot \text{OH}$	03
	(b) The heat of combustion of methane is $-890.65 \text{ kJ mol}^{-1}$ and heat of formation of CO_2 and H_2O are $-395.5 \text{ kJ mol}^{-1}$ and $286.0 \text{ kJ mol}^{-1}$ respectively. Calculate the heat of formation of methane. ($R=8.314 \text{ J/degree.mol}$)	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

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 Nucleophilic 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. ($R = 2 \text{ cal degree}^{-1} \text{ mol}^{-1}$).	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

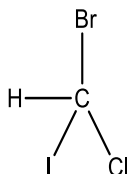
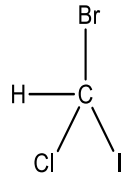
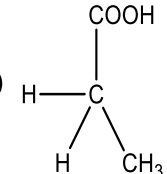
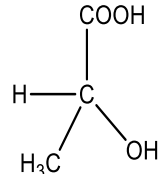
Subject Name:Applied Chemistry

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°C 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:	03
	(i) Carbonium ion (ii) Heat of combustion (iii) Enthalpy	
	(b) Assign R and S Configuration for each of the following compounds.	04
	<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> <p>(i)</p>  </div> <div style="text-align: center;"> <p>(ii)</p>  </div> <div style="text-align: center;"> <p>(iii)</p>  </div> <div style="text-align: center;"> <p>(iv)</p>  </div> </div>	
	(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	03
	(i) $\text{CH}_3\text{CH}_2\text{OH}$ (ii) $\text{CH}_2\text{Cl}-\text{CHCl}_2$ (iii) $\text{CH}_3-\text{CH}_2-\text{CH}_3$	
	(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**

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: **03**
 (i) Specific rotation (ii) Free radical (iii) Chiral carbon
 (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**

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 spectroscopy.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**
