

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER- III(NEW) EXAMINATION – WINTER 2022****Subject Code:3130506****Date:22-02-2023****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 molarity and molality.	03
	(b) Explain the importance of nan-composites.	04
	(c) Differentiate between S _N 1 and S _N 2 reactions. Give one example of each.	07
Q.2	(a) Identify <i>ortho</i> -, <i>para</i> -directing groups; -CN, -NH ₂ , -OH, -NO ₂ , -COOH, -CH ₃ .	03
	(b) Explain Beer-Lambert law.	04
	(c) Draw the phase diagram of Zinc-Cadmium system. Describe its importance.	07
OR		
Q.3	(c) Derive the expression for a first order reaction.	07
	(a) Differentiate between nematic phase and smectic phase.	03
	(b) Suggest a method for resolution of racemic mixture.	04
	(c) Explain the optical isomerism in lactic and tartaric acid.	07
OR		
Q.3	(a) Differentiate between refractories and insulators.	03
	(b) Suggest a suitable bonding theory to explain paramagnetic behavior of O ₂ .	04
	(c) Explain the shape of NH ₃ and SF ₄ on the basis of hybridization and VSEPR theory.	07
Q.4	(a) State basic principle of mass spectroscopy.	03
	(b) State Hess's Law of constant heat summation, its importance in thermo-chemistry.	04
	(c) SEM is powerful tool to study the surface of a material. Explain its principle, instrumentation and applications.	07
OR		
Q.4	(a) Calculate the mole fraction of methanol, if its 16 g is dissolved in 36 g water.	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) Derive Bragg's equation; $n\lambda = 2d \sin \theta$.	07
Q.5	(a) Denote E and Z isomers in but-2ene.	03
	(b) Explain generation, stability and fate of a carbocation.	04
	(c) Give reason: (a) High order reactions are uncommon. (b) Zeolites act as shape selective catalysts.	07
OR		
Q.5	(a) What is glass transition temperature?	03
	(b) Explain generation of a benzyne in elimination-addition mechanism of S _N Ar reactions.	04
	(c) Derive Schrödinger wave equation and explain the importance of ψ .	07
