Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 3130506 **Date: 26-11-2024**

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)**	Write applications of applied chemistry in the service of society.	**03**
	(b)	Explain optical activity by taking tartaric acid as example.	**04**
	(c)	Write notes on: Viscosity, Depression in freezing point, Molarity, Osmosis, Hybridization, Enthalpy, Electronegativity.	**07**
Q.2	**(a)**	Describe following terms: Phase, component, degree of freedom	**03**
	(b)	Explain following terms: Order of stability for free radicals, Intermediate of chlorination of benzene, Markovnikov's rule, Inductive effect	**04**
	(c)	Recognize the type of reaction and support the explanation with mechanism for Synthesis of Methyl alcohol from methyl chloride.	**07**
		OR	
	(c)	Write difference between SN1 and SN2 reactions with detailed mechanism.	**07**
Q.3	**(a)**	Explain: Zeolites, Nanocomposites, Glass transition temperature	**03**
	(b)	Write detailed discussion on Molecular orbital theory with example.	**04**
	(c)	What is phase rule? Explain phase diagram of one component system taking example of water.	**07**
		OR	
Q.3	**(a)**	What is Heisenberg uncertainty principle?	**03**
	(b)	A first order reaction is 20 % completed in 10 minutes. Calculate the time taken for the reaction to go to 80 % completion.	**04**
	(c)	Explain two component silver-lead system with appropriate diagram and details.	**07**
Q.4	**(a)**	Compare and contrast between Enantiomers and diastereomers.	**03**
	(b)	Explain sp3 hybridization with structure bonding and shape of **CH_4, NH_3, H_2O**.	**04**
	(c)	What is first order of reactions? Derive rate law for the first order of reaction, also writes the unit of rate constant.	**07**
		OR	
Q.4	**(a)**	Give details of Schrodinger Wave Equation.	**03**
	(b)	Define: Molecularity of reaction, rate law, E-Z isomers, R-S Configuration	**04**

(c) Vishnu synthesized nitrobenzene from benzene in applied chemistry lab. Help him in solving following details: **07**

(i) Chemical Reaction
(ii) Recognizing type of mechanism (name only)
(iii) Intermediate formed
(iv) Spectroscopic characterization

Q.5 **(a)** Elaborate engineering applications of ceramics, refractories and insulators. **03**

(b) Explain following terms: (i) Florescence, (ii) Heat of combustion (iii) Exothermic reactions (iv) Shielding effect **04**

(c) The equation for the calculation is as following: **07**

$$\mathbf{C_4H_{10}O_{(l)} \rightarrow C_4H_{8(g)} + H_2O_{(g)}}$$

Calculate the enthalpy change, in kJ mol^{-1}, by using the data given below and also write the statement of law governing this.

$$\mathbf{4C_{(s)} + 5H_{2(g)} + \tfrac{1}{2}O_{2(g)} \rightarrow C_4H_{10}O_{(l)} \quad \Delta H = -335\ kJ\ mol^{-1}}$$

$$\mathbf{4C_{(s)} + 4H_{2(g)} \rightarrow C_4H_{8(g)} \quad \Delta H = -17\ kJ\ mol^{-1}}$$

$$\mathbf{H_{2(g)} + \tfrac{1}{2}O_{2(g)} \rightarrow H_2O_{(g)} \quad \Delta H = -242\ kJ\ mol^{-1}}$$

OR

Q.5 **(a)** What is surface characterization? Suggest few methods for the same. **03**

(b) What is Hess's law? Explain its applications. **04**

(c) Write principle of Mass spectroscopy also give details of instrument and its specific applications. **07**

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