Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3171924 Date:16-12-2024

Subject Name: Principles of Combustion

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 heterogeneous reactions.	**03**
	(b)	Explain following terms: (1) Equivalence Ratio (2) Stoichiometry	**04**
	(c)	Explain the H_2-O_2 system in details	**07**
Q.2	**(a)**	Enlist various factors affecting the flame length.	**03**
	(b)	List any four Applications of turbulent flames	**04**
	(c)	Explain Well Stirred flow reactor and Derive expression for it.	**07**
		OR	
	(c)	Write short note on Arrhenius rate expression.	**07**
Q.3	**(a)**	Explain heterogeneous reactions	**03**
	(b)	Determine the stoichiometric equation for combustion of (a) Oxygen (b) Air.	**04**
	(c)	Write short note on rate of reaction and their temperature dependence.	**07**
		OR	
Q.3	**(a)**	Explain Mixture fraction in brief.	**03**
	(b)	Explain counter flow flames in details.	**04**
	(c)	Write short note on Pseudo-first-order reactions and the “fall-off” range	**07**
Q.4	**(a)**	Explain Soot Formation	**03**
	(b)	Explain wrinkled laminar flame regime with neat sketch	**04**
	(c)	Write short note on partial equilibrium assumption.	**07**
		OR	
Q.4	**(a)**	Explain jet flames in short.	**03**
	(b)	What are the objectives of turbulent diffusion flame analysis?	**04**
	(c)	Explain the fundamental one dimensional conservation laws in details	**07**
Q.5	**(a)**	Discuss the concept of Adiabatic Flame Temperature.	**03**
	(b)	Differentiate homogeneous and heterogeneous reaction with suitable example.	**04**
	(c)	Explain laminar flame structure with figure.	**07**
		OR	
Q.5	**(a)**	Explain the Burning of Carbon with chemical equations	**03**
	(b)	Explain conserved scalar concept in short.	**04**
	(c)	Explain wrinkled laminar flame regime with neat sketch.	**07**

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