Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2022

Subject Code:3171924 Date:12-01-2023

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)**	List the main Comparisons between Sub and supersonic combustion thermodynamics.	**03**
	(b)	Explain heat of reaction and formation in brief.	**04**
	(c)	Discuss Global versus Elementary reactions.	**07**
Q.2	**(a)**	Explain Mixture fraction in brief.	**03**
	(b)	In details explain Species mass conservation.	**04**
	(c)	Explain the fundamental one-dimensional conservation laws in details.	**07**
		OR	
	(c)	Explain and derive conserved scalar energy equation.	**07**
Q.3	**(a)**	Explain heterogeneous reactions.	**03**
	(b)	Explain constant volume reactor.	**04**
	(c)	Explain Well Stirred flow reactor and Derive expression for it.	**07**
		OR	
Q.3	**(a)**	Explain Pseudo-first-order reactions.	**03**
	(b)	Determine the stoichiometric equation for combustion of (a) Oxygen (b) Air.	**04**
	(c)	Explain the H2-O2 system in details.	**07**
Q.4	**(a)**	Enlist various factors affecting the flame length.	**03**
	(b)	Enlist various methods for flame stabilization and explain ant one in brief.	**04**
	(c)	Explain chain and chain branching reactions with suitable examples in brief.	**07**
		OR	
Q.4	**(a)**	Explain Soot Formation.	**03**
	(b)	Explain counter flow flames in details.	**04**
	(c)	Explain the factors influencing flame velocity and thickness.	**07**
Q.5	**(a)**	List any three Applications of turbulent flames.	**03**
	(b)	Write short note on “Adiabatic Flame Temperature”.	**04**
	(c)	Explain Simple Model of Droplet Evaporation with all Assumptions.	**07**
		OR	
Q.5	**(a)**	Explain Jet Flames in Brief.	**03**
	(b)	Explain the structure of Turbulent Premixed Flames.	**04**
	(c)	Explain wrinkled laminar flame regime with neat sketch.	**07**

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