GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering - SEMESTER - VII EXAMINATION - WINTER 2025

Subject Code: 3171924 **Date: 01-12-2025**

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)**	Enlist applications of turbulent flames.	**03**
	(b)	Discuss the concept of adiabatic flame temperature.	**04**
	(c)	Write a short note on counter flow flames.	**07**
Q.2	**(a)**	Define (i) Heat reaction (ii) Heat formation (iii) Stagnation pressure.	**03**
	(b)	Differentiate between subsonic and supersonic combustion thermodynamics.	**04**
	(c)	Write a short note on jet flame.	**07**
		OR	
	(c)	Differentiate between laminar premixed flames and laminar diffusion flames.	**07**
Q.3	**(a)**	Explain pseudo-first-order reactions.	**03**
	(b)	Determine the stoichiometry equation for combustion of (a) oxygen (b) air.	**04**
	(c)	Write a short note on plug flow reactor.	**07**
		OR	
	(a)	Explain mixture fraction in brief.	**03**
	(b)	Explain rate of production analysis.	**04**
	(c)	Explain wrinkled laminar flame regime with neat sketch.	**07**
Q.4	**(a)**	Enlist various methods for flame stabilization.	**03**
	(b)	Explain simultaneous interdependent reactions.	**04**
	(c)	Explain structure of turbulent premixed flames.	**07**
		OR	
	(a)	Define "fall-off" range.	**03**
	(b)	Explain extensive and intensive properties with example.	**04**
	(c)	Explain various factors influencing the flame velocity and thickness.	**07**
Q.5	**(a)**	Explain non reacting constant density laminar jet with neat sketch.	**03**

(b) Explain factors affecting the flame length.   **04**

(c) Write a short note on soot formation and destruction.   **07**

<div align="center">

OR

</div>

(a) Enlist applications of combustion system modelling.   **03**

(b) Explain concept of conserved scalar.   **04**

(c) Derive equation for mass conservation.   **07**

<div align="center">

***

</div>