Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V EXAMINATION – SUMMER 2025

Subject Code:3150509 **Date:13-05-2025**

Subject Name:Fuels and Combustion

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.**

Q.1	**(a)**	State the types of mining and basic system of production techniques for mining.	**03**
	(b)	Cite any four industrial applications of coal washing.	**04**
	(c)	Discuss about the direct and indirect methods of coal liquefaction.	**07**
Q.2	**(a)**	State any three industrial examples of solid, liquid and gaseous fuels.	**03**
	(b)	Briefly explain the storage and handling of liquid fuels.	**04**
	(c)	Write a short note on different types of coal combustion techniques.	**07**
		OR	
	(c)	With neat sketch explain the drilling process of petroleum and natural gas.	**07**
Q.3	**(a)**	Enlist the refining products of petroleum.	**03**
	(b)	With suitable examples differentiate between agro fuels and bio fuels.	**04**
	(c)	Discuss about cleaning, purification and quality enhancement of gaseous fuels.	**07**
		OR	
Q.3	**(a)**	What is carbureted water gas? State the applications of carbureted water gas.	**03**
	(b)	Briefly explain the storage and handling of acetylene gas.	**04**
	(c)	Discuss the different reactions involved in the production of producer gas.	**07**
Q.4	**(a)**	Define stoichiometric air and excess air requirement for combustion.	**03**
	(b)	What is net and gross calorific value of fuel? How to determine the calorific value at constant temperature?	**04**
	(c)	What is adiabatic flame temperature? Derive an expression for constant pressure adiabatic flame temperature.	**07**
		OR	
Q.4	**(a)**	Define heat of combustion, heat of reaction and heat of formation.	**03**
	(b)	Differentiate between diffusion flames and premixed flames.	**04**
	(c)	Discuss the working principle and industrial applications of Fluidized bed combustion process.	**07**
Q.5	**(a)**	State the industrial applications of pulverized fuel firing.	**03**
	(b)	Briefly explain the mechanism and kinetics of combustion process.	**04**
	(c)	With neat sketch discuss the working mechanism and industrial applications of atmospheric gas burners.	**07**
		OR	
Q.5	**(a)**	Why do furnaces operate at low efficiency? What are the methods by which furnace efficiencies can be improved?	**03**
	(b)	State the two advantages and applications of walking hearth furnace.	**04**

(c) With neat sketch discuss the working mechanism and industrial applications of rotary cup burners. **07**

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