Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3150509 Date:04-01-2023

Subject Name:Fuels and 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.**

Q.1	**(a)**	State the various important properties of coal.	**03**
	(b)	Write a short note on scenario of coal reservoirs in India.	**04**
	(c)	State the different types of coal combustion techniques and explain any one in detail.	**07**
Q.2	**(a)**	State the characteristics of good fuel.	**03**
	(b)	Enlist the refining products of petroleum.	**04**
	(c)	Write in brief about the proximate and ultimate analysis of coal.	**07**
		OR	
	(c)	Write a short note on accumulation of petroleum in sediments.	**07**
Q.3	**(a)**	State the objectives of coal washing.	**03**
	(b)	Write a short note on agro fuels.	**04**
	(c)	Discuss in brief about production processes and technologies for bio-fuels.	**07**
		OR	
Q.3	**(a)**	Define adiabatic flame temperature and dew point temperature.	**03**
	(b)	Write in short about thermodynamic heat of combustion.	**04**
	(c)	The CO_2 content of the products of complete combustion of a coal of 7,200 kcal/kg CV is 12 % by orsat analysis. Calculate: (a) % excess air (b) volume of air supply at 30 ^oC and 760 mmHg and (c) volume of the flue gas leaving the furnace at 400 ^oC and 760 mmHg per kg of coal fired.	**07**
Q.4	**(a)**	Discuss in short spontaneous ignition temperature.	**03**
	(b)	Explain with neat sketch the atmospheric gas burner.	**04**
	(c)	State the types of combustion process and explain any one in detail.	**07**
		OR	
Q.4	**(a)**	State the various types of coal burning equipment.	**03**
	(b)	State various types of gas burner.	**04**

	(c)	Give the detailed classification of furnaces and discuss the different types of batch furnace.	**07**
Q.5	**(a)**	Discuss in short about the stoker firing.	**03**
	(b)	Write in short about storage and handling of liquid fuels.	**04**
	(c)	Write in brief about velocity of flame propagation.	**07**

OR

Q.5	**(a)**	State the disadvantages of crude coal tar as a furnace fuel.	**03**
	(b)	Explain with neat sketch the pot type burner.	**04**
	(c)	Methane (CH_4) is burned with atmospheric air. The molar analysis of the products on a dry basis is as follows: CO_2 = 10%, O_2 = 2.37%, CO = 0.53%, N_2 = 87.10%. Calculate the air – fuel ratio and the percent theoretical air required for complete combustion.	**07**

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