Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– V • EXAMINATION – SUMMER 2015

Subject Code: 152104 **Date:07/05/2015**

Subject Name: Fuels, Furnaces and Refractory

Time:2.30PM-5.00PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	What is Thermocouple? Discuss the working principle of Thermocouple. Explain the method used for thermocouple calibration.	**07**
	(b)	Define refractory and classify it. Give two examples of each. Write the general requirements of a refractory material.	**07**
Q.2	**(a)**	Discuss the working principle of Optical Pyrometers and explain with diagram the procedure of temperature measurement by it.	**07**
	(b)	What is refractoriness under load? Explain the method to determine refractoriness under load.	**07**
		OR	
	(b)	Explain the general method for manufacturing of refractories. Write the procedure for selection of refractories for a given metallurgical application.	**07**
Q.3	**(a)**	List various factors should be taken into account during furnace design. Explain the role of draft and chimney height in furnace design.	**07**
	(b)	What do you mean by Combustion of fuels? Enlist factors governing complete combustion of a fuel. Discuss effect of excess air on products of combustion.	**07**
		OR	
Q.3	**(a)**	Discuss various possible reasons of heat losses in furnaces and method of their minimization. Comment on method of waste heat recovery in a furnace.	**07**
	(b)	Describe the construction and working of cupola furnace. Give advantage of its applications.	**07**
Q.4	**(a)**	Describe the proximate analysis method for a given coal sample.	**07**
	(b)	Mention the types of arc furnace and explain the construction and working of arc furnace.	**07**
		OR	
Q.4	**(a)**	Explain testing method of calorific value of a given coal sample using bomb calorimeter.	**07**
	(b)	What do you mean by furnace? Explain the construction and working of muffle furnace with figure.	**07**
Q.5	**(a)**	Explain By-product coke oven high temperature carbonization process and differentiate between waste heat oven HTC & regenerative oven HTC process.	**07**
	(b)	Write the composition and application of LD gas. Discuss the factors affecting quantity of converter gas recovered.	**07**
		OR	
Q.5	**(a)**	Write the composition and application of coke oven gas. Discuss the factors affecting composition of it.	**07**
	(b)	Discuss the applicability of Geo-thermal energy and Bio-mass energy resources as a fuel.	**07**

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