Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER V • EXAMINATION – WINTER - 2012

Subject code: 152104 **Date: 16-01-2013**

Subject Name: Fuels, Furnaces and Refractory

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.**

Q.1	**(a)**	Explain By-product coke oven high temperature carbonization process (HTC) and differentiate between waste heat oven HTC & regenerative oven HTC process with suitable figure.	**07**
	(b)	What do you mean by Furnace? Discuss various possible reasons of heat losses in furnaces and method of their minimization.	**07**
Q.2	**(a)**	Define and classify refractories. Give two examples of each. What are the general requirements of a refractory material?	**07**
	(b)	Define fuel and prepare a comparative statement between advantages and disadvantages of solid, liquid and gaseous fuels.	**07**
		OR	
	(b)	Define calorific value. Explain that how one can determine the calorific value of a given coal sample by using bomb calorimeter.	**07**
Q.3	**(a)**	What is coke oven gas? Write the composition and application of coke oven gas. Discuss the factors affecting composition of it.	**07**
	(b)	What is Draft? Explain the role of draft in furnace design. Differentiate between Natural, forced, induced and balanced draft.	**07**
		OR	
Q.3	**(a)**	Mention the requirements of fuel storage. Discuss the methods to minimize spontaneous oxidation during coal storage.	**07**
	(b)	What do you mean by Combustion of fuels? Discuss the factors governing complete combustion of a fuel. Discuss effect of excess air on products of combustion.	**07**
Q.4	**(a)**	Describe the construction and working of cupola furnace. Give advantage of its application?	**07**
	(b)	Explain the general method for manufacturing of refractories.	**07**
		OR	
Q.4	**(a)**	What are the Plasma heating furnaces? Discuss about it in brief. Also give its applications.	**07**
	(b)	Define refractoriness under load and explain the method to determine it.	**07**
Q.5	**(a)**	Discuss the working principle of Optical Pyrometers and explain with diagram the procedure of temperature measurement by it.	**07**
	(b)	Write a note on applicability of Solar energy and Hydrogen energy as a fuel.	**07**
		OR	
Q.5	**(a)**	Explain the method used for thermocouple construction and calibration. What is thermoelectric inversion? Explain.	**07**
	(b)	Mention the types of arc furnace and explain the construction and working of arc furnace. Enlist the advantages of direct arc furnaces?	**07**

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