Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V EXAMINATION – WINTER 2015

Subject Code: 152104 **Date:05/12/2015**

Subject Name: Fuels, Furnaces and Refractory

Time: 10:30am to 1:00pm **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)**	Give definition and classification of refractory. Write two examples of each. Enlist the general requirements of a refractory material.	**07**
	(b)	Explain the method used for thermocouple construction and calibration. What is thermoelectric inversion? Explain.	**07**
Q.2	**(a)**	Define Furnace. Explain the construction and working of muffle furnace with figure.	**07**
	(b)	Define fuel. Explain the proximate analysis method for a given coal sample.	**07**
		OR	
	(b)	Compare between advantages and disadvantages of solid, liquid and gaseous fuels. Discuss about various grades of coal.	**07**
Q.3	**(a)**	Define carbonization. Differentiate between low temperature carbonization (LTC) & high temperature carbonization (HTC) process.	**07**
	(b)	What do you mean by water gas? Write the composition and application of it and discuss the manufacturing process.	**07**
		OR	
Q.3	**(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)	Describe about Solar energy and Wind energy as a fuel.	**07**
Q.4	**(a)**	What do you mean by excess air? Discuss its effect on products of combustion. Explain how clinker formation can minimize.	**07**
	(b)	List various factors should be taken into account during furnace design. Discuss about role of draft in furnace design.	**07**
		OR	
Q.4	**(a)**	What do you mean by Combustion of fuels? Discuss the factors governing complete combustion of a fuel. Give the suitable temperature range for exit flue gas temperature.	**07**
	(b)	Discuss the working principle of Optical Pyrometers and explain with diagram the procedure of temperature measurement by it.	**07**
Q.5	**(a)**	Mention the types of arc furnace and explain the construction and working of arc furnace. Enlist the advantages of direct arc furnaces.	**07**
	(b)	Describe the pyrometric cone equivalent test of refractories with required figure.	**07**
		OR	
Q.5	**(a)**	Describe the construction and working of cupola furnace. Give advantage of it.	**07**

(b) Define refractoriness under load? Explain the method to determine refractoriness under load. **07**

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