

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**
