Seat No.:

Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-V • EXAMINATION - WINTER • 2014

Subject Code: 152104 Date: 01-12-2014 Subject Name: Fuels, Furnaces and Refractory Time: 10.30 am - 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.
- Define furnace. Discuss various possible reasons of heat losses in 07 **Q.1** (a) furnaces and suggest method to minimize heat loss.
 - Define refractory and classify it. Give two examples of each. Give the **(b)** 07 advantages of monolithic refractories.
- Explain By-product coke oven high temperature carbonization process Q.2 07 (a) (HTC) and differentiate between waste heat oven HTC & regenerative oven HTC process with suitable figure.
 - (b) Mention the requirements of fuel storage. Discuss the methods to 07 minimize spontaneous oxidation during coal storage.

OR

- (b) Write the composition and application of producer gas. Discuss the 07 manufacturing process of it.
- 07 **Q.3** (a) Explain the proximate analysis method for a given coal sample.
 - (b) Explain the role of draft in furnace design. Differentiate between 07 Natural, forced, induced and balanced draft.

OR

- What do you mean by flash and fire point of a fuel? Describe the Q.3 07 (a) method used for determination.
 - (b) What do you mean by Combustion of fuels? Discuss the factors 07 governing complete combustion of a fuel. Discuss effect of excess air on products of combustion.
- (a) Explain the construction and working of arc furnace. Enlist the 07 **Q.4** advantages of direct arc furnaces.
 - Describe the construction and working of cupola furnace. Give 07 **(b)** advantage of its applications.

OR

- (a) What are the Plasma heating furnaces? Discuss about it. Mention the 07 **Q.4** advantages and applications.
 - What do you mean by non conventional energy resources? Discuss the **(b)** 07 applicability of Hydrogen energy a fuel.
- Q.5 Explain with diagram the working principle of temperature 07 (a) measurement by radiation pyrometer. Enlist the parameters affect accuracy of Radiation Pyrometers.
 - What is refractoriness under load? Explain the method to determine 07 **(b)** refractoriness under load.

OR

- What is Thermocouple? Explain the method used for thermocouple 0.5 07 (a) construction and calibration. Discuss about thermoelectric inversion.
 - Explain the pyrometric cone equivalent test of refractories with 07 **(b)** suitable figure. Discuss importance of this test.
