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Total Number of Pages: 01

**B.Tech.  
PEMT 5304**

**5<sup>th</sup> Semester Back Examination 2017-18**

**Refractories and Furnaces**

**BRANCH : METTA, MME**

**Time: 3 Hours**

**Max Marks: 70**

**Q.CODE: B436**

**Answer Question No.1 which is compulsory and any five from the rest.  
The figures in the right hand margin indicate marks.**

- Q1 Answer the following questions: (2 x 10)**
- a) Classify different types fuels based on occurrence and give examples of each type ?
  - b) Define carbonization?
  - c) What is ferro-coke? What are the advantages using ferro-coke?
  - d) What is the caking index of coal and how it is determined?
  - e) State and explain the different requirements of combustion ?
  - f) What is the reactivity of coke? What are the methods of determining the reactivity of coke?
  - g) How percentage of volatile matter of coal is determined?
  - h) Define ignition temperature? How the ignition temperature of coal is determined?
  - i) Explain the factors deciding the choice of refractory of a particular furnace?
  - j) What is SIALON? How is it produced?
- Q2 a) Define refractory and describe properties of refractories. What are the points considered before selecting a refractory for a metallurgical application? (5)**
- b) Define refractoriness under load (RUL) and explain RUL test? (5)**
- Q3 a) Describe different refractory materials based on chemical nature with examples? (5)**
- b) Draw flow sheet for wet or dry process of fireclay brick manufacture and mention different stages of firing? (5)**
- Q4 a) Compare Batch Furnaces and Continuous Furnaces used For heat treatment of metals and alloys? (5)**
- b) Describe working of any continuous furnace used for Heat treatment with a sketch? (5)**
- Q5 a) Explain construction and working of an Electric Arc Furnace used for steel melting? (5)**
- b) List advantages of Laser used in Heat treatment? (5)**
- Q6 a) What are the general requirements of a refractory material? (5)**
- b) Explain the working principle of muffle furnace with figure? (5)**
- Q7 The ultimate analysis of bituminous coal (dry basis %) is : C 77, H 5.8, N 1.7, O 4.8, S 2.5 and ash 9. The moisture content is 5 %. The gross calorific power is 7650 Kcal/Kg on dry basis. Calculate Gross calorific value, moist basis and Net calorific value, moist basis (10)**
- Q8 Write short answer on any TWO : (5 x 2)**
- a) Water gas
  - b) Solar energy
  - c) Seyler's classification