

**II B.Tech II Semester Supplementary Examinations,
November/December 2005
FUELS TECHNOLOGY AND REFRACTORIES
(Metallurgy & Material Technology)**

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) What are the properties that a metallurgical coal should possess?
(b) Explain about proximate analysis of coal.
(c) Mention the physical and chemical changes that occur during high temperature carbonisation. [5+5+6]
2. (a) Describe the manufacture, properties and uses of water gas.
(b) Explain the clearing of blast furnace gas. Give the composition, calorific value and uses of blast furnace and coke-oven gases. [8+8]
3. (a) Describe the production of different liquid fuels from crude petroleum. What is LPG?
(b) Write briefly on the tests conducted on coke. [8+8]
4. A furnace is fired by a mixture of blast furnace gas and coke oven gas. The volumetric analysis(dry basis) of individual gases and the flue gas evolved are given below:

Constituent	Coke oven gas	BF gas	Air	Flue gas
CO ₂	2.4	13.4	—	13.5
O ₂	2.0	0.2	21	6.9
CO	7.2	24.2	—	0.4
CH ₄	30.8	—	—	—
H ₂	51.3	3.0	—	—
N ₂	6.3	59.2	79	79.2

Calculate:

- (a) The ratio of BF gas to coke oven gas used
- (b) The percent excess air used [16]
5. (a) Mention the methods of classification of refractories. Give typical example for each.
(b) Discuss the modes of failure of refractories in service and explain how they can be prevented. [6+10]
6. Discuss the manufacture, properties and applications of Fire clay refractories. [16]
7. Explain the testing procedures for:
 - (a) Refractoriness

- (b) Refractoriness under load, and
- (c) Abrasion resistance

[6+5+5]

8. Write short notes on any four:

- (a) Spalling resistance
- (b) Selection of refractories for different zones of blast furnace
- (c) Neutral refractories
- (d) Refractories for by product coke oven
- (e) Dry quenching of coke
- (f) Silica bricks.

[4x4=16]

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