

## ENGINEERING CHEMISTRY-I

Time : 3 Hours

Min. Passing Marks : 24

Total Marks : 80

## Instruction to Candidates :

Attempt any five questions. Selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

## Unit-I

1. What is carbonization. Describe the manufacturing of metallurgical coke by Von Hoffmann's oven method. Discuss also the recovery of by products. [16]

OR

1. Write notes on any four of the following:

- (i) classification of coal [4]
- (ii) metallurgical coke [4]
- (iii) refining of petroleum crude [4]
- (iv) cracking [4]
- (v) synthetic petrol [4]
- (vi) oil gas [4]

## Unit-II

2. (a) What is calorific value of a fuel. Discuss the determination of calorific value of coal by bomb calorimeter. [10]

(b) The ultimate analysis of a coal sample gives the following data

C = 84.5%, N = 0.5%, H = 6%, O = 8.4% and S = 1%. Calculate the high and low calorific values by using Dulong's formula. [6]

OR

2. Write notes on any two of the following:

- (i) Proximate analysis of coal and its significance. [8]
- (ii) Estimation of nitrogen in a coal sample. [8]
- (iii) Jumper's calorimeter. [8]
- (iv) Flue gas analysis by Orsat's apparatus and its significance. [8]

## Unit-III

3. (a) Discuss the polymerization mechanism of free radical polymerization. [8]

(b) Elastomers [8]

OR

3. Write notes on any two of the following:

- (i) Natural Rubber and Vulcanization [8]
- (ii) Synthetic Rubbers [8]
- (iii) Fullerenes [8]
- (iv) Organic Electronic materials [8]

## Unit-IV

4. Describe the manufacturing of portland cement by Rotary kiln method. [16]

OR

4. Write notes on any four of the following:

- (i) Setting and Hardening of cement [4]
- (ii) Basic constituents of cement [4]
- (iii) Optical fibre grade glass [4]
- (iv) Borosilicate glass [4]
- (v) Safety glass [4]
- (vi) Lead glass [4]

## Unit-V

5. (a) What is Refractory. Discuss Requisites of a good Refractory. [8]

(b) Types of lubrication. Discuss extreme pressure lubrication. [8]

OR

5. Write notes on any four of the following:

- (i) Viscosity and Viscosity index [4]
- (ii) Redwood viscometer [4]
- (iii) Flash and fire point [4]
- (iv) Cloud and pour point [4]
- (v) Classification of lubricants. [4]
- (vi) Sager cone test and RUL-test [4]