Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/B.Tech (CT)/SEM-4/CT-403/2010
2010
ENERGY ENGINEERING AND FURNACES

Time Allotted : 3 Hours   Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :

$10 \times 1 = 10$

   i)   Caking property is exhibited by

   a)   Peat b)   Lignite

   c)   Bituminous   d)   Anthracite.

   ii) The bright, glossy and homogeneous texture of coal is due to

   a)   Vitrain   b)   Clarain

   c)   Durain   d)   Fusain.

   iii) A foul smelling petroleum derivative stock is rendered good smelling or odourless by

   a)   Hydrogenation process

   b)   Cracking process

   c)   Visbreaking process

   d)   Sweetening process.

4216   [Turn over

iv) Aniline point indicates

    a) the type of hydrocarbon present in a petroleum product

    b) the kind of additives present in gasoline

    c) the a mount of ash content in petroleum fraction

    d) the sulphur content of fuel oil.

v) LPG is made of which of following types of hydrocarbons ?

    a) C1 – C2   b) C2 – C3

    c) C3 – C4   d) C4 – C5.

vi) Maximum temperature of an oven is

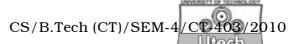   a) 300°C   b) 350°C

    c) 400°C   d) 450°C.

vii) According to pollution prevention norms, minimum height of a chimney should be

    a) 300 ft   b) 100 ft

    c) 200 ft   d) 150 ft.

viii) Sp. Fuel consumption means

    a) Heat utilized by the product/total tonnage

    b) Fuel utilized by the product/total tonnage

    c) Total heat input/total tonnage

    d) Fuel input/total tonnage.

ix) Heating element used for the temperature range 2500°C-3000°C is

   a) Silicon carbide   b) Molybdenum

   c) Carbon & Graphite   d) Tungsten.

x) One per cent fuel is saved for every rise of combustion air temperature by

   a) 17°C b)   19°C

   c) 21°C d)   23°C.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following.   3 × 5 = 15
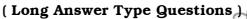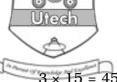
2. Minimisation of wall losses can enhance fuel economy. Discuss.

3. Make a comparison between ceramic and metallic recuperators.

4. What is proximate analysis of coal ? How is it carried out in the laboratory ?

5. What do you mean by Octane number of a gasoline ? How does it differ from Cetane number ?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.   3 × 15 = 45

6. Describe the construction and operation of a by-product coke-oven. Also discuss the process of by-product recovery with the help of a clear sketch.   7 + 8

7. What are the principal reactions in an air-blown producer ? What are the demerits of air-blown producer ? How does the use of steam help to remove the demerits ? Briefly describe the effect of steam quantity on gas producer performance.

    3 + 3 + 5 + 4

8. Differentiate between 'dryer' and 'oven'. Optimum capacity utilization can enhance fuel economy. Explain. Discuss with a sketch the operation of a pebble regenerator. Explain classification of recuperates. Why is actual draught always less than the theoretical one ?   1 + 4 + 4 + 4 + 2

9. Define furnace draught. Discuss mechanism of natural draught. Deduce an equation for natural draught of a chimney.

Estimate the height of a chimney to produce a draught of 30 mm of water column when 30 kg of air is supplied per kg of fuel burnt. The mean temperature of gases within the chimney is 300°C and the temperature of outside air is 30°C.

    1 + 2 + 7 + 5

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