Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

PECH 5303

Fifth Semester Regular Examination – 2014

FUEL AND ENERGY TECHNOLOGY

BRANCH : CHEM

QUESTION CODE : H 186

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.
Assume suitable notations and any missing data wherever necessary.

1. Answer the following questions : 2 ×10

   (a) Differentiate between Gondwana and Tertiary coals.

   (b) Briefly write about the types of losses of coal.

   (c) In washability of coal, what are Cleans and Rejects ?

   (d) Write the reactions involved in the Carbide theory of origin of crude oil.

   (e) Mention the advantages of catalytic cracking over thermal cracking.

   (f) Fluidized hydroformers operate at _____ ^{0}C and _____ kg/cm^2.

   (g) In the production of water gas, what is done to avoid undesirable reactions?

   (h) What is the effect of blast-furnace gas on human health ?

   (i) Write the operating conditions of Fischer-Tropsch reactors.

   (j) What is the importance of multiplication factor (K) in nuclear reactors ?

2. (a) Discuss the steps to be taken to prevent the loss of coal. 4

   (b) What do you understand by washability of coal ? Explain this with a graph. 1+5

P.T.O.

3. (a) Briefly discuss about the Beehive oven for the manufacture of metallurgical coke. 5

(b) Briefly discuss about the properties of coke. 5

4. (a) Compare the thermal cracking reactions with catalytic cracking reactions. 6

(b) Mention the chemical reactions in catalytic reforming. 4

5. Discuss the manufacturing process of producer gas giving emphasis on reactions and reaction zones in gas producer with a neat diagram of the gas producer. 10

6. Discuss the Lurgi gasification process with a neat sketch of the gasifier giving emphasis on the process variables. 10

7. A dry flue gas from a furnace has 12% CO_2, 6% O_2, and rest N_2 by Orsat analysis. Calculate the % excess air used and wt. of combustion air used per kg of oil fired. Assume fuel to have 80% C, 10 % H, 5% S and rest ash. MW of dry flue gas = 28. 10

8. Write short notes on any **two** : 5 × 2

(a) Tar distillation

(b) Factors affecting composition of coke oven gas

(c) Properties of uranium

(d) Pulverized coal firing system.