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

*Total number of printed pages – 2*

B. Tech

PECH 5303

# Fifth Semester (Back/Special) Examination – 2013

## FUEL AND ENERGY TECHNOLOGY

**BRANCH : CHEM**

**QUESTION CODE : D 322**

**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.*

1. Answer the following questions : 2×10



(a) Why freshly mined coal is risky ?

(b) Differentiate between proximate and ultimate analysis.

(c) Write the characteristics of Indian coals.

(d) Write about the origin of crude oil.

(e) Why dehydration and desalting of crude oil is necessary ?

(f) What is octane number ? Mention its importance.

(g) Discuss the parameters affecting cracking.

(h) Write the properties of producer gas.

(i) What do you understand by hydrogenation of coal ?

(j) Write the properties of uranium.

2. (a) Write the steps to prevent loss of coal. 5

(b) Write the pertrographic constituents of coal. 5

P.T.O.

3. (a) With a flow sheet, briefly discuss about tar distillation. 5

(b) Compare LTC and HTC. 5

4. Discuss, in detail, with a neat flow sheet the crude oil distillation. 10

5. Discuss, in detail, the production of blast furnace gas. Also mention the properties and uses. 10

6. Discuss, in detail, the Fischer-Tropsch synthesis. 10

7. The flue gas from a coal fired furnace gives the Orsat analysis as: $CO_2 = 11.5\%$, $CO = 1.5\%$, and $O_2 = 6.5\%$. A coal sample containing $C = 68.0\%$, $N_2 = 1.9\%$, $S = 0.3\%$, and $Ash = 14.7\%$ is used. The dry refuse removed from the furnace has a combustible content of 40% as carbon. Calculate :

(a) the volume of air per kg of coal

(b) kilomoles of dry flue gases per 100 kg of coal

(c) the content of surplus hydrogen and water in coal

(d) % of excess air.

Assume dry air, ambient temperature 30°C, pressure 760 mm Hg and flue gas exit temperature 300°C. 10



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

(a) Washability of coal

(b) Properties of metallurgical coke

(c) Carburetted water gas

(d) Nuclear fuels.