B.Tech-3rd(Chem.Engg.)
Fuel & Combustion

Full Marks : 50

Time : 2.5 hours

Answer **all** questions.

The figures in the right-hand margin indicate marks.

Symbols carry usual meaning.
Any supplementary materials to be provided.

1. Answer *all* questions. 2 × 5

(*a*) Define artificial fuel and natural fuel with example.

(*b*) How coal is transported to the storage area ? Discuss the process.

(*c*) Write down the composition of crude oil in terms of hydrocarbons.

(*d*) Mention the types of cracking process and their importance.

(*e*) Explain the types of gaseous fuels and their importance.

2. (*a*) (*i*) Differentiate coal and coke.

(*ii*) Explain the stages of coal formation along with their heating value. 4

(*b*) Determine the Gross and Net calorific value of a coal having Carbon = 70%, H_2 = 13%, O_2 = 13%, S = 2% and ash is 2%, the latent heat of vaporization is 587 cal/g. 4

Or

(*a*) How nitrogen and sulphur is determined in coal ? Explain the procedures. 4

(*b*) Calculate the Gross and Net CV of solid fuel having 70% C and 30% Hydrogen. The latent heat of the steam is 578 cal/g. 4

3. (*a*) Differentiate the coal types based on the composition. 4

(*b*) Explain Natural gas and its uses. 4

Or

(*a*) Explain the details of the determination of CV using bomb calorimeter with the used formula. 4

(*b*) What is the importance of various ultimate composition coals in the rank of coal ? 4

4. (*a*) Explain the guidelines for the storage of coal in details. 4

(*b*) How to prevent Spontaneous Combustion in coal stockpiles ? 4

Or

(*a*) Explain the Windrow Method and Chevron Method of coal stacking. 4

(*b*) Discuss the Low Temperature Oxidation of Coal And Spontaneous Combustion. 4

5. (*a*) Differentiate atmospheric and vacuum distillation of crude oil. 4

(*b*) What do you understand by reforming process and its types ? Explain properly individually. 4

Or

(*a*) Explain the flexi coking process with flow diagram. 4

(*b*) Differentiate thermal and catalytic cracking process with respect to the composition. 4

6. (*a*) Write short notes on COG. 4

(*b*) On the analysis, a coal sample has the following composition; C = 75%, O_2 = 4%, S = 5%, ash = 3%. The net CV of the fuel is 9797.71 kcal/kg. Calculate the hydrogen and gross CV of the coal. 4

Or

(*a*) Write short notes on BFG. 4

(*b*) Discuss the advantages of CNG over Gasoline. 4