VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA
Odd Mid Semester Examinationfor Academic Session 2025-26

COURSE NAME: B. Tech. SEMESTER: 3rd

BRANCH NAME: Chemical Engineering

SUBJECT NAME: Fuels and Combustion

FULL MARKS: 30 TIME: 90 Minutes

Answer All Questions.

The figures in the right hand margin indicate Marks. *Symbols carry usual meaning.*

Q1. Answer all Questions. [2 × 3]

a) Which is more problematic for environment: Sulphur or Nitrogen? Explain. - CO1

b) Suggest which fuel is most suitable for domestic cooking. Write its two main characteristics. - CO2

c) Compare the manufacture of metallurgical coke in Otto-Hoffmann oven and Beehive oven. - CO3

Q2. [4 × 2]

a) Differentiate between solid, liquid, and gaseous fuels based on advantages and disadvantages. - CO1

b) Describe the In-situ theory and Drift theory of coal formation.

OR

a) Describe the Bomb Calorimeter method for determining calorific value with working principle and procedure. - CO1

b) Explain the difference between Gross Calorific Value (GCV) and Net Calorific Value (NCV) with examples.

Q3. [4 × 2]

a) Discuss the roles of carbon, hydrogen, sulphur, oxygen, and ash in coal. - CO2

b) Explain the industrial and environmental implications of these components.

OR

a) Describe various coal stacking methods with neat sketches. Discuss their advantages and disadvantages. - CO2

b) Discuss the causes of spontaneous combustion of coal during storage. Explain preventive measures to avoid spontaneous combustion in coal yards.

Q4. [4 × 2]

a) Discuss the qualities of good metallurgical coke. - CO3

b) Explain maceral analysis and vitrinite reflectance. Discuss their role in determining coal rank and coke-making suitability.

OR

a) Explain the fractional distillation of crude oil with a neat diagram. - CO3

b) Explain the process of cracking (thermal and catalytic) with reactions, conditions, and significance in petroleum refining.