

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV EXAMINATION – SUMMER 2025****Subject Code:3144401****Date:21-05-2025****Subject Name:Fuel and Combustion****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

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|------------|-----|---|-----------|
| Q.1 | (a) | Discuss calorific value, gross calorific value and net calorific value of fuel | 04 |
| | (b) | State the characteristics of good fuel | 03 |
| | (c) | Write in brief about the theories suggested by geologists regarding the mechanism of formation of coal | 07 |
| Q.2 | (a) | Differentiate between fluid coking and delayed coking | 03 |
| | (b) | Explain the applications, limitations and benefits of biogas | 04 |
| | (c) | What is dewaxing? Discuss the different types of dewaxing processes. | 07 |
| | | OR | |
| | (c) | The following is the ultimate analysis of a sample of petrol by weight: Carbon = 85%, Hydrogen = 15%. Calculate the ratio of air to petrol consumption by weight if the volumetric analysis of the dry exhaust gas is: CO ₂ = 11.5%, CO = 1.2%, O ₂ = 0.9%, N ₂ = 86%. Also find percentage excess air | 07 |
| Q.3 | (a) | The present consumption pattern of solid fuel | 03 |
| | (b) | State the storage, handling and safety for acetylene gas | 04 |
| | (c) | What is producer gas? Discuss the different reactions involved in the production of producer gas | 07 |
| | | OR | |
| Q.3 | (a) | Discuss in short about the scenario of coal reservoirs in India | 03 |
| | (b) | Cite any three industrial applications of bio fuels | 04 |
| | (c) | Discuss the production process, technologies and applications of bio fuels. | 07 |
| Q.4 | (a) | Discuss in short about the stoker firing. | 03 |
| | (b) | Write in short about storage and handling of liquid fuels | 04 |
| | (c) | Write in brief about velocity of flame propagation | 07 |
| | | OR | |
| Q.4 | (a) | Write in short about thermodynamic heat of combustion | 03 |
| | (b) | Differentiate between steam reforming and partial oxidation process for producing hydrogen gas | 04 |
| | (c) | What is dew-point temperature? Explain the method to determine the dewpoint temperature of the combustion products | 07 |
| Q.5 | (a) | State the mechanism and kinetics of combustion process | 03 |
| | (b) | Derive the equation for constant pressure adiabatic flame temperature | 04 |

- (c) Gasoline is burned steadily with air in jet engine. Determine the air to fuel ratio and the percentage excess air used for combustion. Assume the complete combustion of gasoline **07**

OR

- Q.5** (a) Explain spontaneous ignition temperature. **03**
(b) Name the various types of furnace and explain the working of any one **04**
(c) Define turn down ratio of burner. State the various types of gas burner with their applications **07**
