

Enrolment No./Seat No _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI EXAMINATION – SUMMER 2025

Subject Code: 3160207

Date: 22-05-2025

Subject Name: Alternative Fuels and Power Systems

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.

- Q.1 (a) Differentiate between conventional fuel and alternate fuel. What are the alternate fuel are being used in India, also explain the methodology to use it for any one type of fuel for CI and SI engine respectively. 07
- (b) Define 1) Fire point 2) Flash point 3) Pour point and 4) Viscosity as per ASTM standard. 04
- (c) Why pure alcohol as fuel is used for racing car as blending? 03
- Q.2 (a) Explain biodiesel production process with diagram as per ASTM standard. 07
- (b) What modification in vehicle is required for the use of ethanol blend more than 10% and 20% in engine-give reasons for same. 04
- (c) Discuss advantages and disadvantages of methanol. 03
- OR
- (c) Differentiate Bi-fuel and Dual fuel engine with its example. 03
- Q.3 (a) Compare the fuel properties of CNG and Gasoline. Based on property justify that the CNG is suitable to SI engine. 07
- (b) Compare LPG and CNG from its property, performance, emission and safety point of view. 04
- (c) What are ecofriendly plastic fuels? 03
- OR
- Q.3 (a) Explain the effect of vegetable oil on engine performance and emission characteristics with reason. 07
- (b) Explain the properties of Jatropha seed oil and its Biodiesel in detail. 04
- (c) Define: (i) Emulsification (ii) Esterification (iii) Pyrolysis 03
- Q.4 (a) Hydrogen is more suitable to SI engine than CI engine- Justify the statement with fuel properties. 07
- (b) Describe with neat sketch the solar powered automobiles with its advantages and limitations. 04
- (c) Describe in short, the metal hydride hydrogen storage methods for Automobile. 03
- OR
- Q.4 (a) Compare the Electric and Hybrid vehicle. 07
- (b) Define the following Motor characteristics: 04
- (i) Nominal voltage, (ii) Rated torque & (iii) Base speed
- (c) Explain positive and negative consequences of electric vehicles. 03
- Q.5 (a) Describe the fuel cell vehicle with its performance and safety aspects. 07
- (b) Explain working of the stratified charge engine in detail with neat sketch. 04

- (c) Describe in short, the compressed hydrogen storage methods for Automobile. 03

OR

- Q.5 (a) For electric vehicle, what are the parameters affecting the battery storage capacity? – discuss them in detail. 07
- (b) Give the detailed classification of various electric motors used in electric vehicle powertrain. 04
- (c) Explain different biogas production process stages. 03
