

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER– VI EXAMINATION – SUMMER 2026****Subject Code:3160207****Date:22-05-2026****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)** Define following terms for fuel **07**
 1) Specific gravity, 2) Kinematic Viscosity, 3) Flash Point, 5) Pour Point, 6) Calorific value of Gaseous and liquid fuels.
- (b)** Define alternate Fuels. What is energy security? **04**
- (c)** Explain the drawback of using pure alcohol as fuel in vehicle. **03**
- Q.2 (a)** What is emulsification of alcohol with diesel? Describe performance and emission Improvement by blending of alcohol with diesel. **07**
- (b)** What modification in engine is required for the Biodiesel blend more than 20% in engine-give reasons for same. **04**
- (c)** Discuss the various factors affecting biogas formation process. **03**
- OR**
- (c)** What is effect of Biogas as fuel on Engine performance and emission? **03**
- Q.3 (a)** Explain the effect of vegetable oil and Biodiesel on engine performance and emission characteristics with reason. **07**
- (b)** Define: (i) Emulsification (ii) Esterification (iii) Pyrolysis **04**
- (c)** Differentiate Bi-fuel and Dual fuel engine with its example. **03**
- OR**
- Q.3 (a)** Describe the pure biodiesel production process as per ASTM standard. **07**
- (b)** Compare LPG and CNG from its property, performance, emission and safety point of view. **04**
- (c)** What are ecofriendly plastic fuels? **03**
- Q.4 (a)** Compare series type and parallel type hybrid electric vehicle with suitable diagrams. **07**
- (b)** Define the following Battery characteristics: **04**
 (i) Energy Density, (ii) Power Density, (iii) State of Charge
- (c)** Explain positive and negative consequences of electric vehicles. **03**
- OR**
- Q.4 (a)** Describe with neat sketch the solar powered automobiles with its advantages and limitations. **07**
- (b)** Define the following Motor characteristics: **04**
 (i) Nominal voltage, (ii) Rated torque & (iii) Base speed
- (c)** Compare the Electric and Hybrid vehicle. **03**
- Q.5 (a)** Hydrogen is more suitable to SI engine than CI engine- Justify the statement with fuel properties. **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)** Compare the Variable Compression Ratio engine and Free piston engine. **07**
- (b)** Describe the fuel cell vehicle with its performance and safety aspects. **04**
- (c)** Describe in short, the metal hydride hydrogen storage methods for Automobile. **03**
