# GUJARAT TECHNOLOGICAL UNIVERSITY

## M.E Semester: 2

**Mechanical Engineering (I.C.Engine & Automobile)**

Subject Name Alternate Fules and Energy

| Sr.No | Course content |
|---|---|
| 1. | Conventional fuels; Estimation of conventional fuels; advantages and disadvantages of conventional fuels; Need for Alternate fuel; Availability and Comparative properties of Alternate fuels; Use of Alcohols; LPG, Hydrogen; CNG and LNG; Vegetable oils and Biogas in Automotive Engines;, Relative merits and demerits of various alternate fuels. |
| 2. | Manufacture of Alcohols; Properties as engine fuels Alcohols and Gasoline blends; Performance in S. I. Engines: Methanol and gasoline blends; Effect of compression ratio; Alcohols in Stratified charge engines; Combustion characteristics in engines; Reformed alcohols use in CI Engines; Ignition accelerators; Alcohol Diesel emulsions; Dual fuel systems. |
| 3. | Various vegetable oils for engines; Esterification Performance in engines; Biogas in engines; Performance and Emission characteristics; Shale oil, coal liquid and Tars and fuel; Performance and Emission characteristics. |
| 4. | Availability of CNG; Properties; Modification required to use in Engines; Performance and Emission characteristics of CNG, LPG in SI and CI Engines; Performance and Emission data for LPG; Hydrogen Production methods; Storage and handling; Performance; Safety aspects. |
| 5. | Layout of an electric vehicle; Advantages and limitation; specifications; System components; Electronic control system; High energy and power density batteries; Hybrid vehicles; Solar energy based vehicles; Hydrogen energy based vehicles; Latest development. |

List of Experiments:

1. Testing of Internal combustion engine according to Indian and International standards.
2. Study the properties of conventional fuels and Need for an alternative fuels.
3. Study of measurement technique as per ASTM and measurement of different fuel properties.
4. Performance test on a 4 stroke 4 cylinder diesel engine with different blends of a biodiesel.
5. Study of Hydrogen as a alternate fuel for auto vehicle.
6. Study of an Electric & Hybrid Car.
7. Case study on performance of a dual fuel engine using LPG-Diesel fuel and study of a LPG vehicle.
8. Study of a CNG as a substitute fuel for an I.C. engine.
9. **Group Discussion or Technical quiz.**

Reference Books:


1. Alternate fuels guide book, Bechtold R.L, SAE
2. Solar Engineering of Thermal Processes Duffie & Beckman John Wiley
3. Energy, the Biomass Option Bungay John Wiley
4. Introduction to Wind Energy Technology Lysen Georgia Inst.
5. Energy, Doolittle Matrix Pub.
6. Energy & Environment, Fowler McGraw Hill
7. Solar Energy S.P. Sukhatme Tata McGraw Hill