

**M.E Semester: 1 M.E Mechanical (Automobile Engineering)**  
**Subject Name: Alternate Fuels and Energy (Elective-I) MEA105B**

**A. Course Objective**

- To present a problem oriented in depth knowledge of Alternate fuels and energy
- To address the underlying concepts and methods behind Alternate fuels and energy

**B. Teaching / Examination Scheme**

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
MEA105B	Alternate fuels and energy	3	0	0	3	3	3	70	30	20	0	120

**C. Detailed Syllabus**

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.

**D. Lesson Planning**

<b><u>SR.NO</u></b>	<b><u>DATE/WEEK</u></b>	<b><u>UNIT NO</u></b>	<b><u>%WEITAGE</u></b>	<b><u>TOPIC NO</u></b>
1	1 <sup>ST</sup> , 2 <sup>ND</sup> , 3 <sup>RD</sup>	1	20	1
2	4 <sup>TH</sup> , 5 <sup>TH</sup> , 6 <sup>TH</sup>	2	20	2
3	7 <sup>TH</sup> , 8 <sup>TH</sup> , 9 <sup>TH</sup>	3	20	3
4	10 <sup>TH</sup> , 11 <sup>TH</sup> , 12 <sup>TH</sup>	4	20	4
5	13 <sup>TH</sup> , 14 <sup>TH</sup> , 15 <sup>TH</sup>	5	20	5

**E. Instructional Method & Pedagogy**

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

**F. Students Learning Outcomes**

- The student can identify different areas of Alternate fuels and energy.
- Can find the applications of all the areas in day to day life.

**G. Recommended Study Materials**

- **Text & 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

