



Diploma branch in which subject is offered: - Automobile Engineering

Objective: The course is designed for understanding of future fuel and energy systems for automobile applications in the context of production, storage, efficiency and emission.

Credits Earned: 4

Course Outcomes: Automobile Engine,

After learning the course, the students should be able to:

- To understand broad comprehension of future alternative transportation fuels- alcohol, biodiesel, biogas and their production technologies.
- To understand environmental assessment and performance assessment of alternative fuels.
- To understand Electric, Hybrid fuel cell and solar vehicle technologies and their economic consideration
- To apply various methods for alternative fuel usages and engine modification requirement in automobile engines

Pre-requisite of course: Automobile Engine, Fuel and Lubricant

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
3	0	2	4	50	30	20	25	25	150

Contents:

Sr. No.	Topics	Teaching hrs.	Weightage
1	Introduction to Alternative Fuel Introduction to alternative fuels, Need for alternative fuels, Availability of different alternative fuels for SI and CI engines, Selection criterion of fuel, Selection criteria of raw material.	4	10
2	Alcohol Introduction, Raw Material Selection criteria for Methanol and Ethanol, Potential of Methanol and Ethanol (Petrol Blends and	8	20



	Diesel Blends, Bio diesel production ingredient, Di methyl ether, Fuel cell) Production method of ethanol, Production methods of methanol, Methanol Economics, Methanol and Ethanol Safety Aspects, Properties of Methanol and Ethanol, Methanol and Ethanol Engine tests, Methanol and Ethanol Benefits, Engine Modification required for alcohol uses in SI and CI engine		
3	Biodiesel Introduction, Raw materials used for production of Bio Diesel, Biodiesel production methods, Bio Diesel Production Equipment, Types of Transesterification process, Bio Diesel Properties, Bio Diesel Quality Standards, Performance characteristics of biodiesel, Engine Tests for Bio Diesels, Engine Modification required for biodiesel uses in engine, Challenges for Bio Diesel	6	15
4	Biogas Introduction, Biogas production method, Biogas Plants, Factors affecting biogas formation, Engine Modification required for biogas uses in SI and CI engine, Biogas purification methods, Emission Characteristics of biogas, Storage and safety aspect of Biogas	6	15
5	CNG & LPG and Hydrogen Potential of LPG, LPG production, Properties of LPG, LPG Modeling studies, LPG Engine tests, LPG Material compatibility, LPG Economics, LPG Safety aspects, LPG Merits and Demerits, CNG Storage, CNG Distribution, CNG Safety, CNG Advantages, CNG challenges, Hydrogen Production, Hydrogen Storage, Hydrogen Properties, Hydrogen Economics, Hydrogen Safety, Hydrogen in Fuel cell, Hydrogen in SI and CI engines, Hydrogen Benefits, Hydrogen Barriers and challenges	8	20
6	Electric, Hybrid, Fuel cell and Solar vehicle Introduction, Need of Electric, Hybrid, Fuel cell and Solar vehicle, Principle of Electric Vehicles, Construction of Electric vehicles, Benefits and Challenges of Electric Vehicle, Fuel-Cell Vehicles, Types of Fuel cell vehicle, Topological configuration of electric, hybrid vehicle.	8	20

References:

a) List of Books

1. Alternative Fuels Guide book by Bechtold R.
2. Alternative Fuels by Arumugam S Ramadhas



3. Modern Electric, Hybrid Electric and Fuel cell Vehicles by Mehrdad Ehsani, Yimin Gao, Ali emadi

b) List of Major Equipment/ Instrument

1. Penky's Martin Fire point Measurement
2. Cleveland Flash point Measurement
3. Viscometer
4. Exhaust Gas Analyser
5. Non-Contact Magnetic stirrer with heating

Suggested Theory distribution:

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
30%	40%	20%	10%	0	0

Suggested List of Tutorials/Experiments

1. To measure various properties of alcohol.
2. To measure various properties of vegetable oil.
3. To prepare Biodiesel from vegetable oil.
4. To measure various properties of Biodiesel.
5. Emission analysis of CNG based vehicle.
6. Emission analysis of Petrol based vehicle.
7. Emission analysis of Diesel based vehicle.
8. To prepare model of electric and hybrid vehicle.
9. To prepare model of fuel cell vehicle.
10. To prepare model of solar vehicle.