

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Automobile Engineering						
Semester	VIII	Version	1.0.0.0						
Effective from Academic Year	2020-21	Effective for the batch Admitted in	July 2017						
Subject code	2AE802	Subject Name	Alternate Fuels for Engines						
Teaching scheme			Examination scheme (Marks)						
(Per week)	Lecture(DT)	Practical(Lab.)	Total	CE	SEE	Total			
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50

Pre-requisites:

None

Objectives of the Course:

After completion of this course, student will be able to

1. Introduction to alternative fuels like biofuels – Alcohol , Biodiesel, Biogas
2. Understanding hydrogen gas as fuel of the future
3. Introduction to fuel cell technology for automobiles
4. Introduction of Electric and Hybrid vehicles
5. Discuss the use of energy sources with regard to future supply and the environment.
6. Discuss solutions to the supply and environmental issues associated with Alcohol as an alternative fuel for IC Engines.

Theory syllabus

Unit	Content	Hrs
1	Introduction: Concept of petroleum fuels, Need for alternate fuel, availability and properties of alternate fuels, general use of alcohols, LPG, hydrogen, ammonia, CNG and LNG, vegetable oils and biogas, merits and demerits of various alternate fuels, introduction to alternate energy sources. Like EV, hybrid, fuel cell and solar cars.	9
2	Alcohols Properties as engine fuel, alcohols and gasoline blends, performance and emission analysis in SI engine, Feasibility study of alcohols in CI engines, performance and emission analysis in CI engines, modifications required to use in engines, DME, DEE properties performance analysis, Flex fuel vehicle, reformed alcohol.	9
3	Natural gas, LPG, Hydrogen and Biogas Availability of CNG, LPG, properties, modification required to use in engines, performance and emission characteristics of CNG & LPG in SI & CI engines, Hydrogen; storage and handling, performance and safety aspects, Introduction to Biogas system, Process during gas formation, Factors affecting biogas formation. Usage of Biogas in SI engine & CI engine.	9
4	Vegetable Oil and Synthetic Alternative Fuels Various vegetable oils for engines, esterification, performance in engines, performance and emission characteristics, bio diesel and its characteristics, biodiesel standards. Di-Methyl Ether (DME), P-Series, Eco-Friendly Plastic fuels (EPF).	9
5	ELECTRIC, HYBRID, FUEL CELL AND SOLAR CARS: Layout of an electric vehicle, advantage and limitations, specifications, system components, electronic control system, high energy and power density batteries, hybrid vehicle, Concept of fuel cells based on usage of Hydrogen and Methanol. Power rating, and performance. Heat dissipation, Layout of fuel cell vehicle, Solar cells for energy collection. Storage batteries, layout of solar powered automobiles. Advantages and limitations.	9

Practical content

Practical assignments and tutorials are based on above syllabus.

Text Books

1	Richard.L.Bechfold – Alternative Fuels Guide Book - SAE International Warrendale - 1997.
2	Maheswar Dayal - “Energy today & tomorrow“- I & B Horish India - 2012.
Reference Books	
1	Nagpal - “Power Plant Engineering” - Khanna Publishers, 16th edition, 2015.
2	“Alcohols as motor fuels progress in technology” - Series No.19 - SAE Publication USE - 1980.
ICT/ MOOCs references	
1.	https://www.youtube.com/watch?v=QoruG4ma210
Course Outcomes:	
<ol style="list-style-type: none"> 1. Introduction to alternative fuels like biofuels – Alcohol, Biodiesel, Biogas. 2. Understanding hydrogen gas as fuel of the future. 3. Introduction to fuel cell technology for automobiles. 4. Introduction of Electric and Hybrid vehicles. 	