

Code	Category	L	T	P	C	I.M	E.M	Exam
B20MEH101	Honors	3	1	--	4	30	70	3 Hrs.

ALTERNATIVE FUELS AND ENERGY SYSTEMS

(Honors Degree Course in ME)

Course Objectives:

1. To impart the knowledge of basics of alternative fuels for Internal combustion engine and alternative drive systems for automobiles, principle of solar energy collection
2. To impart the knowledge of methods of production of Bio gas, methanol, ethanol, SVO, Bio diesel and various aspects of electrical and Hybrid vehicles
3. To study the use of various gaseous fuels and hydrogen for internal combustion engine application

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Describe need for alternative fuels for Internal combustion engine and alternative drive systems for automobiles, principle of solar energy collection, construction of photo voltaic cells	K2
2.	Explain various properties, methods of production of Bio gas, methanol, ethanol, SVO, Bio diesel	K2
3.	Illustrate the use of hydrogen and various gaseous fuels, reformulated conventional fuels & future alternative fuels for internal combustion engine application.	K3
4.	Explain the various aspects of electrical and Hybrid vehicles	K2

SYLLABUS

UNIT-I (10Hrs)	<p>Introduction: Types of energy sources, their availability, need of alternative energy sources, Nonconventional energy sources, Classification of alternative fuels and drive trains. Scenario of conventional auto fuels, oil reserves of the world. Fuel quality aspects related to emissions. Technological up gradation required business driving factors for alternative fuels. Implementation barriers for alternative fuels. Stakeholders of alternative fuels, Road map for alternative fuels.</p> <p>Solar energy: Solar energy geometry, solar radiation measurement devices. Solar energy collectors, types of collectors. Direct application of solar energy, solar energy storage system. P. V. effect solar cells and characteristics. Application of solar energy for automobiles.</p>
UNIT-II (10 Hrs)	<p>Biogas: History, properties and production of Biogas, classification of biogas plants, biogas storage and dispensing system. Advantages of biogas, hazards and emissions of biogas. Production, properties, Engine performance, advantages and disadvantages of Methanol, Ethanol, Butanol, Straight vegetable oil, Biodiesel for internal combustion engine application.</p>
UNIT-III (10 Hrs)	<p>Hydrogen: Properties and production of hydrogen, Storage, Advantages and disadvantages of hydrogen, use of Hydrogen in SI and CI engines. Hazards and safety systems for hydrogen, hydrogen combustion. Emission from hydrogen.</p> <p>Gaseous fuels: Production, properties, Engine performance, advantages and disadvantages of CNG, LNG, ANG, LPG and LFG.</p>

UNIT-IV (10 Hrs)	<p>Reformulated Conventional Fuels: Introduction. Production of coal water slurry, properties, as an engine fuel, emissions of CWS. RFG, Emulsified fuels. Hydrogen-enriched gasoline.</p> <p>Future Alternative Fuels: Production, properties, Engine performance, advantages and disadvantages of PMF, Ammonia, Liquid-Nitrogen, Boron, Compressed Air, Water as fuel for Internal combustion Engine.</p>
UNIT-V (10 Hrs)	<p>Alternative Power Trains: Components of an EV, EV batteries, chargers, drives, transmission and power devices. Advantages and disadvantages of EVs. Hybrid electric vehicles, HEV drive train components, advantages of HV. History of dual fuel technology, Applications of DFT. Dual fuel engine operation. Advantages and disadvantages of dual fuel technology.</p>
Text Books:	
1.	Alternative Fuel. S .S. Thipse JAICO. Publishing House 2015
2.	Non-Conventional Energy SourcesG. D. Rai Khanna Publishing NewDelhi.2010
Reference Books:	
1.	Alternative fuels guide. R. Bechtold SAE 2005
2.	Alternative energy sources T.N Veziroglu McGraw Hill 2001
3.	Automotive Fuels Guide Richard L.BechtoldSAE Publications 1997
4.	Alternative fuels for vehicle book by M. Poulton

		Course Code: B20MEH101			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			R20
ALTERNATIVE FUELS AND ENERGY SYSTEMS					
(Honors Degree Course in Mechanical Engineering)					
Time: 3 Hrs			Max. Marks: 70 M		
Answer ONE Question from EACH UNIT					
All questions carry equal marks					
			CO	KL	M
UNIT-I					
1.	a).	Briefly discuss the conventional and non-conventional sources of energy?	1	2	7
	b).	What is the need of alternative fuels? Explain the implementation barriers of alternative fuels?	1	2	7
OR					
2.	a).	Explain the different types of flat type solar collector with the help of neat sketch.	1	2	7
	b).	Explain the working of a photovoltaic cell with the help of neat sketch.	1	2	7
UNIT-II					
3.	a).	Briefly discuss the major factors that affect power deration in diesel engine when using Bio diesel as its fuel?	2	2	7
	b).	Explain the performance characteristics of ethanol when used in an IC engine.	2	2	7
OR					
4.	a).	Describe the working of a biogas plant with a neat sketch and explain its performance on IC engines.	2	2	7
	b).	Explain the hazards and emissions of biogas.	2	2	7
UNIT-III					
5.	a).	Explain the chemical production of hydrogen.	3	2	7
	b).	Illustrate the properties of hydrogen and safety systems required for hydrogen storage.	3	3	7
OR					
6.	a).	Explain the performance of an IC engine when using CNG as its fuel.	3	2	7
	b).	Illustrate the properties of gaseous fuels ANG, LPG and LFG.	3	2	7
UNIT-IV					
7.	a).	Illustrate the Production of coal water slurry.	3	3	7
	b).	Briefly discuss the concept of Hydrogen-enriched gasoline.	3	2	7
OR					
8.	a).	Explain the chemical production of Liquid-Nitrogen.	3	2	7
	b).	Describe the properties of Ammonia and Boron.	3	2	7
UNIT-V					
9.	a).	Briefly discuss the future possibilities of an electric vehicle?	4	2	7
	b).	How hybrid electric vehicles are classified? Explain any two.	4	2	7
OR					
10.	a).	Discuss the design considerations required for constructing an electric vehicle?	4	2	7
	b).	Explain any two types of motor used in electric vehicles.	4	2	7