

## **AT8012 ALTERNATIVE FUELS AND ENERGY SYSTEMS**

### DETAILED SYLLABUS

#### **OBJECTIVE:**

- To know about the types of alternative fuels and energy sources for IC engines.

#### **UNIT I ALCOHOLS AS FUELS**

Introduction to alternative fuels. - Need for alternative fuels - Availability of different alternative fuels for SI and CI engines. Alcohols as fuels. Production methods of alcohols. Properties of alcohols as fuels. Methods of using alcohols in CI and SI engines. Blending, dual fuel operation, surface ignition and oxygenated additives. Performance emission and combustion characteristics in CI and SI engines.

#### **UNIT II VEGETABLE OILS AS FUELS**

Various vegetable oils and their important properties. Different methods of using vegetable oils engines – Blending, preheating Transesterification and emulsification of Vegetable oils - Performance in engines – Performance, Emission and Combustion Characteristics in diesel engines.

#### **UNIT III HYDROGEN AS ENGINE FUEL**

Production methods of hydrogen. Combustive properties of hydrogen. Problems associated with hydrogen as fuel and solutions. Different methods of using hydrogen in SI and CI engines. Performance, emission and combustion analysis in engines. Hydrogen storage - safety aspects of hydrogen.

#### **UNIT IV BIOGAS, NATURAL GAS AND LPG AS FUELS**

Production methods of Biogas, Natural gas and LPG. Properties studies. CO<sub>2</sub> and H<sub>2</sub>S scrubbing in Biogas., Modification required to use in SI and CI Engines- Performance and emission characteristics of Biogas, NG and LPG in SI and CI engines.

#### **UNIT V ELECTRIC, HYBRID AND FUEL CELL VEHICLES**

Layout of Electric vehicle and Hybrid vehicles – Advantages and drawbacks of electric and hybrid vehicles. System components, Electronic control system – Different configurations of Hybrid vehicles. Power split device. High energy and power density batteries – Basics of Fuel cell vehicles.

#### **TEXT BOOK:**

1. Ayhan Demirbas, 'Biodiesel A Realistic Fuel Alternative for Diesel Engines', Springer-Verlag London Limited 2008, ISBN-13: 9781846289941

#### **REFERENCES:**

1. Devaradjane. Dr. G., Kumaresan. Dr. M., "Automobile Engineering", AMK Publishers, 2013.

Diploma, Anna Univ UG & PG Courses

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*Syllabus*  
*Question Papers*  
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[www.AllAbtEngg.com](http://www.AllAbtEngg.com)

2. Gerhard Knothe, Jon Van Gerpen, Jargon Krahl, The Biodiesel Handbook, AOCS Press Champaign, Illinois 2005.
3. Richard L Bechtold P.E., Alternative Fuels Guide book, Society of Automotive Engineers, 1997 ISBN 0-76-80-0052-1.
4. Science direct Journals (Biomass & Bio energy, Fuels, Energy, Energy conversion Management, Hydrogen Energy, etc.) on biofuels.
5. Transactions of SAE on Biofuels (Alcohols, vegetable oils, CNG, LPG, Hydrogen, Biogas etc.).