



Semester – IV

Subject Name: Fuels & Lubricants

Subject Code: 09AE0403

Diploma branch in which subject is offered: - Automobile Engineering

Objective:

This course enables students of automobile engineering to understand underlying concepts and methods behind automobile fuels and lubricant.

Credits Earned: 4

Course Outcomes:

After learning the course the students should be able to:

To get the knowledge of various Conventional fuel.

To get the knowledge of properties of various fuels.

Understand the lubrication system required for automobiles.

To get an inside view of various alternative fuels.

Pre-requisite of course: Automobile Engine

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	Manufacture of fuels and lubricant Requirement of Fuels, classification of petroleum fuels, Structure of petroleum refining process, thermal and catalytic cracking, polymerization, alkylation isomerisation, products of refining process, Blending, Basic requirements of lubricant, Types of lubricants its uses & sources, Theory of origin and accumulation of crude oil, Methods of searching crude oil, manufacture of finished automotive lubricants	7	15
2	Properties and Additives of Fuel Various desirable properties of SI and CI engine fuels-	7	15



	relative density, calorific value, fire point, distillation, vapour pressure, flash point, spontaneous ignition temperature, viscosity, pour point, flammability, ignitability, diesel index. API gravity, aniline point Viscosity index etc, effect of various properties on engine performance, Measurement of various fuel properties, octane rating and Cetane Rating, requirements of an additive, petrol fuel additives and diesel fuel additives		
3	Combustion and Rating of Fuels Combustion in SI engine, Normal and abnormal combustion, Factors affecting normal combustion, Ignition Lag and factors affecting it, Pre-ignition and its effects, Detonation, its effects and factors affecting Detonation and prevention, Combustion in CI engine, Phases of combustion in CI engine, Factors affecting combustion in CI engine, Ignition Lag and factors affecting it, Diesel knock, its effects and factors affecting it and prevention, Rating of Fuel, Octane number, merits and demerits of higher octane fuel and normal octane fuel, Cetane number	10	20
4	Introduction to Engine Friction and Lubricants Engine frictional losses, Factors affecting frictional losses, Boundary lubrication, Hydro dynamic lubrication, Basic requirements of lubricants, Classification and types of lubricating oil (based on crude oil, synthetic oil), Specific requirements for automotive lubricants, oxidation, deterioration and degradation of lubricants, Various treatment given to the lubricating Oil, Types of grease and its characteristics	8	20
5	Properties and Additives of Lubricants Various properties of lubricating oil, Gradation of lubricating oil, Introduction of ISO Cleanliness code, Function and type of additives of lubricating oil	4	10
6	Alternative Fuel Introduction to various Alternative fuels, Requirement of various alternative fuels, Properties, storage and performance of Alcohol, Hydrogen, LPG, CNG, Bio Gas, Bio diese, Introduction to alternate energy sources like, electric vehicle, hybrid, fuel cell & solar cars..	6	20

References:

1. Internal combustion engines by V.M. Domkundwar
2. Automobile Engineering by K. M. Gupta
3. Fuels and Lubricants by M. Popovich and Haring, John Wiley & Sons, Inc
4. Internal Combustion Engine by R. K. Rajput
5. Alternative Fuels Guidebook by R.L.Bechtold, SAE Publications



Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

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

Suggested List of Experiments:

1. Draw the chart & Describe distillation process of crude oil.
2. Determination of viscosity of given sample of fuel using u-tube viscometer..
3. Determination of viscosity of lubricating oil at different temperature.
4. Determination of flash and fire point of given sample of fuel.
5. Determination of specific gravity of given sample of fuel by westphal Balance
6. Determination of carbon residue of lubricating oil.
7. Study of CFR engine and knock meter.
8. Study of measuring API gravity of fuel.
9. Determination of cloud and pour point of given sample of oil.

Suggested List of Student Activities

- a) Internet based assignment related to crude oil and refinery work.
- b) Visit of fuel station and collect data about instrument they used to check the properties of fuel and norms and precautions they are following
- c) Internet based assignment/literature survey for types of lubricants with their specific use
- d) Market survey to find out the specification of different types and brands of fuels and lubricants and their relative cost
- e) Internet based assignment to check the use of alternative fuels along with advantages of using them and problem encountered by using them

Instructional Method:

- a) Visit to a fuel station
- b) Use of animation or video clips
- c) Chart (such as combustion phenomenon of SI and CI engine, distillation process)