

1151AU216 AUTOMOTIVE FUELS, LUBRICANTS AND COOLANTS **L T P C**
3 0 2 4

1. Preamble

This course automotive fuels and lubricants enable learners to understand the properties of fuels and lubricants for the design and operation of the I.C engines.

2. Pre-requisite

1150CH101	Engineering Chemistry
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3. Links to other courses

Fuel conservation & Alternate fuels

4. Course Educational Objectives

Students undergoing this course are expected to

- Understand the manufacturing of fuels and lubricants
- Understand the detailed working of lubricants
- Develop their knowledge in methods involved in testing of fuels and lubricants

5. Course outcomes

Upon the successful completion of the course, students will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Describe the manufacturing & refining process of fuels and lubricants	K2, S2
CO2	Describe various types of frictions in engine and lubrication system and verify the properties through viscometer.	K2, S2
CO3	List the requirements, types and classification of lubricating oils, grease and solid lubricants used in automobiles and verify its physical properties by penetration test.	K2, S2
CO4	Describe the different properties and testing procedures of fuels used in automobiles and verify those with flash and fire point, ASME and aniline distillation, red vapor pressure, carbon residual, copper corrosion, ash, cloud and pour point tests.	K2, S2
CO5	Describe the combustion theories in SI and CI Engines and additives used to enhance the engine performance	K2, S2

6. Correlation of COs with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	H	H		H		L		H	H	L		H	H
CO2	H	H	H		H		L		H	H	L		H	H
CO3	H	H	H		H		L		H	H	L		H	H
CO4	H	H	H		H		L		H	H	L		H	H
CO5	H	H	H		H		L		H	H	L		H	H

H- High; M-Medium; L-Low

7. Course content

UNIT – I: MANUFACTURE OF FUELS, LUBRICANTS AND COOLANTS L- 9 P-6

Structure of Petroleum, Refining Process, Fuels, Thermal Cracking, Catalytic Cracking, Polymerization, Alkylation, Isomerisation, Blending, Products of Refining Process. Manufacture of Lubricating Oil Base Stocks, Manufacture of Finished Automotive Lubricants, Ultra-Low Sulphur Diesel, Measurement of Sulphur Content, Coolants Manufacturing.

UNIT – II: THEORY OF LUBRICATION AND COOLING L- 9 P-6

Fundamentals of Friction and Wear, Introduction to Engine Friction, Total Engine Friction, Effect of Engine Variables on Friction, Hydrodynamic Lubrication, Elasto Hydrodynamic Lubrication, Boundary Lubrication, Bearing Lubrication, Functions of The Lubrication System, Introduction to Design of a Lubricating System, Theory of Cooling.

UNIT – III: LUBRICANTS L- 9 P-6

Specific Requirements for Automotive Lubricants, Oxidation Deterioration and Degradation of Lubricants, Additives and Additive Mechanism, Synthetic Lubricants, Classification of Lubricating Oils, Properties of Lubricating Oils, Tests on Lubricants. Grease, Classification, Properties, Test Used in Grease, Solid Lubricants

UNIT – IV: PROPERTIES AND TESTING OF FUELS L- 9 P-6

Thermo-Chemistry of Fuels, Properties and Testing of Fuels, Relative Density, Calorific Value, Distillation, Vapour Pressure, Flash and Fire Point, Spontaneous Ignition Temperature, Self-Ignition Temperature, Viscosity, Cloud and Pour Point, Flammability, Ignitability, Diesel Index, Api Gravity, Aniline Point.

UNIT – V: COMBUSTION & FUEL RATING L- 9 P-6

Knocking, Octane Rating, CFR Engine, Fuel Requirements –SI And CI Engine, Cetane Rating. Additive - Mechanism, Requirements of an Additive, Petrol Fuel Additives and Diesel Fuel Additives – Specifications of Fuels.

75 Periods

8. Practicals

List of Experiments

1. Temperature Dependence of Viscosity of Lubrication Oil by Redwood Viscometer.
2. Viscosity Index of Lubricating Oil By Say Bolt Viscometer.
3. Flash and Fire Points of Fuels/Lubricants.
4. ASME Distillation Test of Gasoline.
5. Drop Point of Grease and Mechanical Penetration in Grease.
6. Aniline Distillation Test of Gasoline.
7. Calorific Value of Liquid Fuel Using Bomb Calorimeter
8. Reid Vapor Pressure Test.
9. Carbon Residue Test.
10. Copper Corrosion Test.
11. Cloud and Pour Point Test.
12. Ash Content Test.

Total: 30 periods
Total (45+30): 75 Periods

9. Text Books

1. Ganesan.V., “Internal Combustion Engineering”, Tata McGraw-Hill Publishing Co., New Delhi, 2012.
2. M.L. Mathur, R.P.Sharma “A course in internal combustion engines”, Dhanpatrai publication, 2012.
3. Obert.E.F “Internal Combustion Engineering and Air Pollution”, International book Co., 2011.

10. References

1. Brame, J.S.S. and King, J.G. – Fuels – Solids, Liquids, Gaseous, 2012
2. Francis, W – Fuels and Fuel Technology, Vol. I & II, 2010
3. Hobson, G.D. &Pohl.W- Modern Petroleum Technology, 2011
4. A.R.Lansdown – Lubrication – A practical guide to lubricant selection – Pergamon press –2012.
5. Raymond.C.Gunther – Lubrication – Chilton Book Co., -2010.