

Branch Name:	Automobile Engineering
Program Code:	ET408
Course Title:	Fuels and Pollution Control System
Course Code:	2ET4080304
Pre-requisite Course:	-----

Course Objectives:

1. Student will able to learn the conventional fuels and its properties.
2. Different types of lubrication oils and grease.
3. SI and CI Engine combustion process.
4. Various Pollution Control Methods.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	0	2	3	60	40	20	30	150

Course Contents:

Unit No	Topic	Total Hours	Weightage (%)
1	Conventional Fuels, their properties and additives. - Fuel and its types with merits and demerits. - Basic requirement of IC-engine fuel. Conventional fuels used for vehicle (Gasoline and diesel – comparison) their source, main constituents. - Hydrocarbon- Its structure and composition. - Characteristics of Conventional fuel used in vehicle. - Various desirable properties of SI engine fuels and their effect on engine performance. - Additives of diesel (which and for what purpose) - Rating of fuel: (1) Octane number (2) Cetane number	08	20
2	Lubricants - Role of lubricating oil in a vehicle. - Classification of lubricating oil on the basis of their use in a vehicle. - Properties of lubricating oil and their effect. - Grading of lubricating oil. - Role of grease in a vehicle. - Properties of grease used in a vehicle. - Classification of grease on the basis of constituents. - Factors to be considered while selecting grease.	08	25
3	Combustion Process in SI and CI engine. - Combustion in IC engine. - Normal and abnormal combustion in SI and CI engine. - Factors responsible for abnormal combustion in SI and CI engine. - Ignition Lag and factors affecting it in SI and CI engine. - Pre-ignition and its effects. - Detonation in SI engine, its effects, factors affecting it and prevention. - Diesel knock, its effects, factors affecting it and prevention.	10	25

4	Automotive emission, emission control systems and emission measurement. • Theoretical air-fuel ratio • Carbon monoxide (CO) gas. • Hydro Carbon (HC) gas. • Oxides of Nitrogen (NO_x). • Driving conditions and exhaust gases. • Necessity and operation of Positive Crankcase Ventilation (PCV) system. • Necessity and operation of fuel evaporative emission control (EVAP) system. • Catalytic converters. • Exhaust gas re-circulation (EGR) system. • Pollution control norms and its importance. • Emission measurement methods • Exhaust gas analyser • Diesel smoke meter.	16	30
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List of Practical:

1. Measure flash and fire point of given sample of fuel.
2. Measure viscosity of given sample of fuel and lubricant by viscometer.
3. Measure cloud point and pour point of given sample of oil.
4. Measure dropping point of given sample of grease.
5. Prepare and explain the chart of normal and abnormal combustion in SI engine and list out symptoms of abnormal combustion with preventive measure.
6. Identify various emission control system in modern four wheeler, list them with the purpose.
7. Identify catalytic converter, muffler and replace it.
8. Check emission level from car with the help of exhaust gas analyzer and compare with present norms of pollution limit.

Reference Books:

1. Fuels and Lubricants M. Popovich and Carl Haring Wiley, 1959 ISBN: 0471694657, 9780471694656
2. Internal Combustion Engines (4TH EDITION-2017) V. Ganesan Tata McGraw-Hill Co., Ltd., New Delhi. ISBN: 9781259006197
3. Lubrication and Lubricants J. H. Hyde Sir I. Pitman & sons, Limited, 1922 ISBN-13: 978-1-332-02153-6 / 9781332021536.
4. Automobile Engineering (Vol– I) Anil Chhikara Satya Prakashan, New Delhi ISBN-10 : 8176845051 ISBN-13 : 978-817684505
5. Automotive Fuel and Emissions Control Systems James D. Halderman, James Linder Pearson; 3rd edition (20 January 2011) ISBN-10 : 0132542927 ISBN-13 : 978-0132542920

List of Open-Source Software/learning website:

1. <https://www.howacarworks.com>
2. <https://www.youtube.com/watch?v=vp6vVotshX0&pp=ygUeYXV0b21vdGl2ZSBmdWVsIGFuZCBwcm9wZXJ0aWVz>
3. <https://www.youtube.com/watch?v=vnGuG8ztm4&pp=ygUYb2N0YW5lIGFuZCBjZXRhbmUgbnVtYmVy>
4. <https://www.youtube.com/watch?v=cKzf9yp6HOs&pp=ygUbZ3JhZGluZyBvZiBsdWJyaWNhdGluZyBvaWxz>
5. <https://www.youtube.com/watch?v=KQWrR8MzHjI&pp=ygULZWdyIHdvcmtpbmc%3D>
6. <https://www.youtube.com/watch?v=JotiMO3R8bQ&pp=ygUbGN2IHZhbHZlIHdvcmtpbmcgYW5pbWF0aW9u>

Course Learning Outcomes (CLO):

1. Interpret the effect of various properties and additives of fuel on the function of the engine.
2. Interpret the effect of various types of lubricants used in a vehicle based on their properties and additives.
3. Determine the role of conventional fuel in combustion and causes as well as preventive measures for abnormal combustion.
4. Analyze the work of various systems/components used in vehicle for pollution control.

Mapping of CLO with PO and PSO

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	M		L				M	L		L			M		L	
CLO2		M		M								M		L		
CLO3	M		L		L		M			L			M	L	M	
CLO4	L	M	L	M	L							M	L		M	

H: High, M: Medium, L: Low