

Branch Name:	Automobile Engineering
Program Code:	ET408
Course Title:	Automobile Engine
Course Code:	2ET4080301
Pre-requisite Course:	-----

Course Objectives:

1. Basic Fundamentals of S.I. & C.I. Engine.
2. To understand the working & construction of different types of I.C. engine components.
3. Maintain petrol and diesel automotive engines

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	
3	0	2	4	60	40	20	30	150

Course Contents:

Unit No	Topic	Total Hours	Weightage (%)
1	Introduction of IC engine • Brief introduction history of automobile vehicles and evolution of automobile engine. • Definition of Internal Combustion Engine. • Engine terminology: bore, stroke, clearance volume, swept volume, TDC, BDC, compression ratio, mean effective pressure, Volumetric efficiency, indicated power, break power, friction loss, mechanical efficiency, thermal efficiency, power and torque. • Classification of Internal Combustion Engine on basis of its working and construction, operating principal and basic Engine cycle: -Four stroke spark ignition engine cycle. -Four stroke compression ignition engine cycle. • Engine specification details for single cylinder and multi cylinder engine.	08	20
2	Constructional and functional details of I.C engine components • Construction, functions, requirement, working process, engineering material, manufacturing process involved for making and engineering considerations for following engine components, subassemblies and system. - Piston - Piston rings, Cylinder liner - Cylinder block - Connecting rod - Crankshaft - Camshaft - Crankcase - Flywheel - Engine head assembly - Combustion chamber • Construction, functions, requirement and working process of following engine components, sub-assemblies and system. - Intake manifold - Air filter - Exhaust manifold - Intake & exhaust valves - Catalytic converter - Resonator - Muffler - Engine Pulley - Timing belt - Gasket - Bearings use in engine. • Requirement of combustion chamber in S.I. and C.I engine. - Types of combustion chamber and its effects on combustion process.	08	20

	- Valve timing diagram for four stroke spark ignition and compression ignition engine. - Construction, functions and working of following valve timing mechanism - Push rod and rocker arm - Single Over Head Camshaft (SOHC) - Dual Over Head Camshaft (DOHC) - Variable Valve Timing. - Engine Ignition Timing, firing order.		
3	Fuel supply system for petrol and diesel engine - Requirement of fuel supply system for engine. - Define air-fuel ratio, stoichiometric air-fuel ratio and lean & rich air-fuel ratio. - Basic working principal of carburation process. - Construction and working details of simple carburetor. - List merit and demerit of carburetor-based fuel supply system. - Construction, functions, types and working details of following components of fuel supply system. - Fuel tank - Electronic fuel pump - Fuel filters - Canister - Fuel line and fittings - High pressure fuel pump - Throttle body - Intake manifold, port and runner. - Fuel water separator. - Construction, working and type of fuel injectors. - Basic principle and working of Electronic Fuel Injection system. - Throttle Body Injection (TBI) system. - Port Fuel Injection (PFI) system. - Multiport injection (MPI). - Common Rail Diesel Fuel Injection (CRDI) system.	14	30
4	Cooling system of IC engine - Requirement of cooling system in internal combustion engine. - Types of cooling system use in engine. - Construction, working of liquid cooling system and its components. - Thermostat - Water pump - Water jacket - Upper and lower radiator hose - Radiator - Cooling fan - Electric cooling fan - Coolant temperature sensor - Radiator expansion tank and radiator cap. - Characteristics, properties, purpose and types of coolant use in liquid cooling system. - Causes of overheating.	06	15
5	Lubricating system of IC engine - Requirement and importance of lubricating system in engine. - Properties, additives and types of engine oil. - SAE & API rating of engine oils. - Types of lubricating system. - Construction, working of splash, dry sump, wet sump and pressure feed lubrication system and its components.	06	15

List of Practical:

1. Interpret four-stroke Otto-cycle using cut-section of four stroke petrol engine and prepare specification list for petrol engine.
2. Interpret four-stroke Diesel-cycle using cut-section of four stroke diesel engine and prepare specification list for diesel engine.
3. Draw valve timing diagram of four-stroke petrol/diesel engine referring single cylinder four-stroke petrol/diesel cut section engine model.
4. Identify and locate basic components of fuel supply system, electronic sensors and control module of single or multicylinder petrol engine (BS-IV or BS-VI).
5. Compare construction details of mechanical and electronic fuel injector.

6. Prepare list for petrol and diesel engine coolant; discuss major characteristic and property difference based on coolant grade and type.
7. Identify and locate components of engine lubrication system. Perform engine lubrication oil level and quality check test using dipstick.

Reference Books:

1. Automobile Mechanics William Crouse Tata Mc-Graw Hill Publication ISBN-13:978-0-07-063435-0.
2. Automotive engine Theory and servicing James D Halderman Pearson Education ISBN-13: 978-0134654003.
3. Automobile Engineering: Volume 1 Singh Kirpal Standard Publishers ISBN: 9788180141713.
4. Automobile engineering K. M. Gupta Umesh Publication ISBN: 818811422005.

List of Open-Source Software/learning website:

1. <https://www.howacarworks.com>
2. <https://swayam.gov.in>
3. <https://auto.howstuffworks.com>
4. <https://nptel.ac.in>
5. <https://tinyurl.com/ym2bv29b> for video link
6. <https://tinyurl.com/2p8u6733> for web link

Course Learning Outcomes (CLO):

1. Interpret engine fundamental, terminology and specification.
2. Illustrate function of engine components.
3. Illustrate different components of fuel supply systems for SI & CI Engines.
4. Describe the different component of cooling system with reference to their construction and working.
5. Describe the different component of lubricating system with reference to their construction and working.

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	L							M	L		
CLO2					M				L			L				
CLO3	H	M					L						L	M	L	
CLO4	M				L					L		M	L	M		
CLO5		M	L	L						L			L			

H: High, M: Medium, L: Low