

**Subject Code: 01AE503**

**Subject Name: Automobile Engines**

**B.Tech. III Year - (Sem-5) Automobile Engineering**

**Type of course:** Under Graduate

**Prerequisite:** Elements of Mechanical Engineering

**Rationale:** -The course aims to impart basic skills for understanding of construction of automobile engines working principle and performance under various conditions.

**Teaching and Examination Scheme:**

Teaching Scheme (Hours)			Credits	Evaluation Scheme					Total Marks
Theory	Tutorial	Practical		Theory Marks			Practical Marks		
				ESE (E)	IA	CSE	Viva (V)	Term Work (TW)	
3	0	2	4	50	30	20	25	25	150

**COURSE OUTCOME**

After learning the course, the students should be able to

1. Understand the basic working principles of engines, its Construction and Operation
2. Understand phenomena of Combustion and Design of Combustion Chambers.
3. Conduct Engine Testing and Performance and understand Performance characteristics.

SR No	CONTENTS	Total Hours	Weightage
1	<b>Construction and Operation:</b> Constructional and working principal of 2 stroke and 4 stroke-spark ignition (SI) and compression ignition (CI) engines. Comparison of SI and CI engines and four stroke and two stroke engines. Engine classification, firing order. Otto, diesel and dual cycles.	5	15
2	<b>Fuel Supply Systems for SI Engine:</b> Air fuel ratio requirements of SI engines, Air fuel ratio and emissions. Requirements of an automotive carburetor; Working of a simple fixed venture carburetor, Constant vacuum carburetor, compensation, Maximum power devices. Fuel feed systems, LPG and CNG fuel systems. MPFI systems for petrol.	6	12

<b>3</b>	<b>Fuel Supply Systems for CI Engine:</b> Diesel fuel injection systems, Air and solid injection, Jerk pumps, distributor pumps, Unit injector, Need for a governor for diesel engines - Mechanical and Pneumatic governors. Fuel injector - pintle and multi-hole nozzles, Spray characteristics, pump calibration. CRDI systems for diesel.	5	12
<b>4</b>	<b>Combustion and Combustion Chambers:</b> Introduction to combustion in SI and diesel engines and stages of combustion. Knock in SI and CI engines. Effect of engine variables and knock. Combustion chambers for SI and CI engines. Direct and indirect injection combustion chambers for CI engines. Importance of Swirl, squish and turbulence. Factors controlling combustion chamber design.	8	18
<b>5</b>	<b>Supercharging and Turbocharging:</b> Necessity and limitation, Different methods of turbocharging, Intercooling, Turbocharger controls including, waster gate, variable geometry, variable nozzle types.	4	12
<b>6</b>	<b>Cooling and Lubrication System:</b> Need for cooling, types of cooling systems- air and liquid cooling systems. Thermosyphon and forced circulation and pressurized cooling systems. Properties of coolants. Requirements of lubrication systems. Types-mist, pressure feed, dry and wet sump systems. Properties of lubricants.	5	15
<b>7</b>	<b>Engine Testing and Performance Characteristics:</b> Dynamometers, indicated thermal, brake thermal and volumetric efficiencies. Measurement of friction, Cylinder pressure measurement. Engine performance maps, Engine testing standards. Variables affecting engine performance. Methods to improve engine performance. Heat balance.	7	16

**Distribution of Theory Marks**

R Level	U Level	A Level	N Level	E Level
10	25	30	20	15

**Legends: R:** Remembrance; **U:** Understanding; **A:** Application, **N:** Analyze, **and E:** Evaluate

**Reference Books:**

1. A Textbook of Internal Combustion Engines by R.K Rajput, Laxmi Publication, NEW DELHI, 2005
2. Internal Combustion Engines by V. Ganesan, Tata-McGraw Hill Publishing Co., New Delhi, 1994.
3. Automotive Engines by E. H. Ellinger, Prentice Hall Publishers, 1992
4. Diesel Engines by C.BDicksee, Blackie & Son Ltd., London, 1964.

**List of Experiments:**

1. To identify the major components of different automobile engines
2. To study two stroke cycle engine.
3. To study four stroke CI and SI engine.
4. To study the fuel supply system of petrol & diesel engines and represent the same in sketches
5. To study the engine lubrication system circuit.
6. To analyze Computerized Exhaust Gas of a petrol engine, & a diesel engine; and, to compare the outputvalue to the prescribed limit set by the Government.
7. To perform the Morse Test on I.C. engine.
8. To perform the Heat Balance Test on petrol / diesel engine.
9. To study the performance characteristics of petrol / diesel engine by using an engine test rig.

**List of OpenSource Software/learning website:**

1. <http://nptel.ac.in/>
2. [www.learnerstv.com](http://www.learnerstv.com)
3. <http://auto.howstuffworks.com/>
4. [nptel.iitk.ac.in/](http://nptel.iitk.ac.in/)