

ME308: I.C. ENGINES AND COMPRESSORS
CREDITS = 5 (L=3, T=0, P=2)

Course Objective:

To provide the detailed understanding of internal combustion engines and reciprocating compressors.

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE	CE	ESE	CE		
3	0	2	5	70	30	30	20	150

Course Content:

Unit No.	Topics	Teaching Hrs.
1	<p><u>Introduction:</u></p> <p>Basic components and terminology of IC engines, working of four stroke/two stroke - petrol/diesel engine, classification and application of IC engines, P-V and valve timing diagram. Modern engines</p> <p>Testing of I C Engine:</p> <p>Aims of engine testing, measurement of indicated power, brake power, friction power, speed, air consumption, fuel consumption. IC engine efficiencies, specific output, specific fuel consumption, heat balance sheet.</p>	10
2	<p><u>I C engine fuels:</u></p> <p>Desirable properties of I. C. engine fuels, required qualities of S.I and C.I engine fuels, rating of S.I and C.I. engine fuels, HUOCR, dopes/additives for S.I. & C.I. engines, alternate fuels like CNG, LNG, LPG, vegetable oils, biodiesel, alcohol, biogas and hydrogen for IC engines.</p> <p>Fuel supply systems for S.I engines:</p> <p>Fuel supply system for SI engines, properties of air-petrol mixture, mixture requirement for different loads and speeds, simple carburetors and its working, calculation of air-fuel ratio, types of carburetors, limitations of a single jet carburetor, modern carburetors, problems in carburetors, altitude compensation, gasoline injection in SI engines, MPFI system for modern automobile engines.</p> <p>Fuel supply systems for C.I. engines: Requirement of ideal injection system, types of injection systems, fuel pumps and injectors, types of nozzles, spray formation, quantity of fuel and size of nozzle orifice.</p>	10

3	<u>Systems for I C Engine:</u> Ignition system: battery, magneto, and electronic, spark plug, firing order. Governing system : quality, quantity & hit and miss governing, Scavenging systems: scavenging processes & systems Cooling system: Air and Water Cooling system, Types of cooling systems Lubricating System: Properties, additives added to lubricating oil, types of lubrication Supercharging: Objects, Supercharging of SI and CI engines, effects of supercharging, supercharging limits, methods of supercharging, turbo charging	06
4	<u>Combustion in S.I. Engines:</u> Stages of combustion, ignition lag and the factors affecting the ignition lag, flame propagation and factors affecting flame propagation, abnormal combustion and knocking in SI engines, factors affecting knocking, effects of knocking, control of knocking. Combustion in C.I. engines: Stages of combustion, delay period, ignition lag and the factors affecting it, detonation in C.I. engines, factors affecting detonation, controlling detonation.	06
5	<u>IC Engine Pollution & its control:</u> Effect of different pollutants on human and plant life, Emission of pollutants from SI & CI engines, control of emissions from SI and CI engines, measurement of pollutants in exhaust gases, Emission norms.	04
6	<u>Reciprocating compressors:</u> Classification of compressors, Isothermal, Polytrophic and adiabatic compression processes, Effect of clearance volume, volumetric and isothermal efficiency, Multistaging with inter cooling, Optimization of working variables, Analysis of reciprocating air compressor.	06

TOTAL	42
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Reference Books:

1. Internal combustion engines by Mathur & Sharma, Dhanpatrai & sons, New Delhi.
2. Internal combustion engines by V.Ganeshan (Tata Mc Grawhill pub.co. ltd., New Delhi)
3. A course in internal combustion engines by V.M. Domdumwar, Dhanpatrai & Co. (p) Ltd, New Delhi
4. Elements of I C Engines by Rogowaski (Mc Grawhill)
5. The I C Engine Theory and Practice Vol.I by Taylor (John Wiley)

Course Outcomes (COs):

At the end of this course students will be able to ...

1. Discriminate types and working of I C Engines and to analyze the performance of I C Engine.
2. Interpret fuel used in IC engine and its supply system.
3. Interpret various systems used in IC engine.
4. Interpret the basic combustion process and categorize combustion chambers used in IC engine.
5. Identify different pollutants, its effect on human /environment and measure of pollutant from I C Engine
6. Ascertain reciprocating compressors, its processes and analysis of compressor