



CVM
UNIVERSITY

Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: Bachelor of Technology (Mechanical Engineering)

Semester: VII

Course Code: 202090702

Course Title: I C Engine

Course Group: Professional Core Course-XVII

Course Objectives: The course is designed to provide the detailed understanding of internal combustion engine mainly based on its performance and emission parameters.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
3	0	2	4	50 / 18	50 / 17	25 / 9	25 / 9	150 / 53

* J: Jury; V: Viva; P: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Introduction: Basic components and terminology of IC engines, working of four stroke/two stroke - petrol/diesel engine, classification and application of IC engines, engine performance and emission parameters, valve, and port timing diagrams.	4
2	Fuel Air Cycles and Actual Cycles: Assumptions for fuel-air cycles, Reasons for variation of specific heats of gases, change of internal energy and enthalpy during a process with variable specific heats, isentropic expansion with variable specific heats, effect of variable specific heats on Otto, Diesel and Dual cycle, dissociation, comparison of air standard and fuel air cycles, effect of operating variables, comparison of air standard and actual cycles, effect of time loss, heat loss and exhaust loss in Petrol and Diesel engines	8
3	Fuels and its supply system for SI and CI engine: Important qualities of IC engine fuels, Carburation, mixture requirement for different loads and speeds, simple carburettor and its working, types of carburettors, MPFI, types of injection systems in CI engine	7



4	Ignition and Governing System: Spark plug, firing order, quality, quantity & hit and miss governing. Supercharging: Need for supercharging, Effect of supercharging, types of supercharger, methods of supercharging, thermodynamic analysis of supercharged engine cycle, limitations of supercharging, turbocharging.	5
5	Combustion in SI and CI Engines: Stages of combustion in SI engines, abnormal combustion and knocking in SI engines, factors affecting knocking, effects of knocking, control of knocking, combustion chambers for SI engines, Stages of combustion in CI engines, detonation in C.I. engines, factors affecting detonation, controlling detonation.	8
6	Engine Lubrication and Cooling: Lubrication of engine components, Lubrication system – wet sump and dry sump, crankcase ventilation, Types of cooling systems – liquid and air cooled, comparison of liquid and air-cooled systems.	4
7	Measurement and Testing of IC engines: Measurement of indicated power, brake power, fuel consumption and emission, Measurement of friction power by Willan's Line Method* and Morse Test*, calculation of brake thermal efficiency, brake power and brake specific fuel consumption of IC Engines, variable compression ratio engines, heat balance sheet of IC Engines	4
8	Engine Emission and their control: Air pollution due to IC engines, Euro I to VI norms, HC, CO and NO _x emission, catalytic convertor. Recent development in Internal combustion engines. Electric Vehicles	5
Total		45

List of Practicals / Tutorials:

1	Study of valve timings for four stroke Petrol/Diesel Engine.
2	Performance test of 2 stroke Petrol Engine.
3	Performance test of 4 stroke Diesel Engine.
4	Study of the Performance test of 4 stroke Petrol Engine.
5	Study about ignition and governing system of I C engines.
6	Study about supercharging and turbo charging of I C engines.
7	Study about various methods for measurements and testing of I C engines.
8	Study of determination of friction power of multi cylinder petrol engine using Morse Test Method.
9	Study of calorimeters and determination of calorific value for solid/liquid/gaseous fuel.
10	Study of emission norms of I C Engine and Study of PUC.

Reference Books:

1	Internal Combustion Engine by M.L.Mathur and R.P.Sharma, Dhanpat Rai Publications (P) Ltd.
2	Internal Combustion Engine by V Ganeshan, McGraw Hill Education Pvt Ltd.
3	Fundamentals of Internal Combustion engine by H.N.Gupta, PHI Learning.
4	Internal Combustion Engines 2 nd Edition by Colin Ferguson and Allan Kirkpatrick, Wiley India Pvt. Ltd.
5	Internal Combustion Engine Fundamentals by John B. Heywood, McGraw Hill Education Pvt Ltd.



6	Internal Combustion Engines by V Domkundwar, Dhanpat Rai Publication(P) Ltd..
7	Internal Combustion Engines by R K Rajput, Laxmi Publication.

Supplementary learning Material:	
1	NPTEL resources

Pedagogy:	
<ul style="list-style-type: none"> • Direct classroom teaching • Audio Visual presentations/demonstrations • Assignments/Quiz • Continuous assessment • Interactive methods • Seminar/Poster Presentation • Industrial/ Field visits 	

Internal Evaluation:

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
10%	20%	50%	10%	5%	5%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Do in-depth cycle analysis for different types of engines.	32
CO-2	Analyse fuel supply systems, ignition and governing systems of IC Engines.	22
CO-3	Understand combustion process of SI and CI Engines.	20
CO-4	Measure operating characteristics of IC Engines.	16
CO-5	Compare the experimental results with theoretical trends.	10

Curriculum Revision:	
Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	--
Next Review on (Month-Year):	June-2025