ME411: I. C. Engines										
L	**T**	**P**	Credit	Area		**CWS**	**PRS**	**MTE**	**ETE**	**PRE**
3	0/1	2/0	4	DEC/GEC		15/25	25	20/25	40/50	-

Objectives: To enable the students to understand the mechatronic systems and components, and simulation of dynamic systems. To understand Fundamentals of Stepper and servo motors and Digital logic.

Syllabus		**Contact Hours**
Unit-1	**Introduction to I.C Engines**: Classification; two and four stroke, SI and CI engines parts, working principle and valve and port timing diagram	**6**
Unit-2	**Combustion Phenomenon in SI engines:** Principles of combustion in SI engine, effect of engines and operating variables on ignition delay & flame propagation, combustion chamber for SI engines, cycle to cycle variation, pre-ignition, abnormal combustion, theory of detonation, effect of engine and operating variables on detonation, surface ignition, adiabatic flame temperature, ignition systems	**8**
Unit-3	**Combustion phenomenon in CI engines:** Principles of combustion in CI engine, delay period, variables affecting delay period, diesel knock, methods of controlling diesel knock, combustion process & combustion chambers for CI engines	**8**
Unit-4	**Fuel system and Mixture requirement in SI and CI Engine:** Carburetion- working principles, chemically correct air-fuel ratio and load variation, compensating devices, venture and jet dimension calculation, modern fuel induction system, multi point fuel injection system, fuel injection: common rail direct injection	**6**
Unit-5	**Engine Testing, Supercharging, Lubrication and Engine Cooling:** Engine performance and testing, measurement of power, supercharging limits of SI &CI engines methods of supercharging, superchargers, turbo charging, lubrication principles, function of lubricating system, properties of lubricating oil, additives, cooling system, air cooling, water cooling	**8**
Unit-6	**Introduction to Automotive Fuels:** Petroleum based fuels and their properties, knock rating of engine fuels, necessity of alternative fuels, LPG, CNG, producer gas, biogas, H2, biodiesel and alcohols	**6**
	Total	**42**

Reference Book:	
1	**I.C Engines and Air Pollution** by E.F. Obert, Intext Educational Publishers, ISBN-9780700221837.
2	**I.C Engines** by Ferguson, John Wiley & Sons, ISBN- 0471356174.
3	**Fundamentals of I.C Engines** by J.B Heywood, Tata McGraw-Hill Companies, ISBN- 9780070286375.
4	**I.C Engines** by Mathur& Sharma, Dhanpat Rai and Sons, ISBN- 9383182428.
5	**The Internal Combustion Engine - Theory and Practice Vols. I & II** by C.F. Taylor, MIT Press, ISBN-02627002711.

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Course Outcomes

CO1	Understand the basic principles of working of IC engines and make them realize the need for the development of ICE.
CO2	To Understand the ICE design process and parameters.
CO3	Analyse ideal and real working cycles and performance analysis.
CO4	Describe Fuel system and Mixture requirement in SI and CI Engine.
CO5	Able to understand engine testing, supercharging, lubrication and engine cooling
CO6	Basics of fuels used in engines.

CO-PO/PSO Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	0	1	0	0	0	0	3	3	2	2
CO2	2	2	3	3	2	1	1	0	0	0	0	3	3	2	2
CO3	2	2	2	2	2	1	1	0	0	0	0	2	3	2	3
CO4	3	2	1	2	2	1	0	0	0	0	0	2	3	3	2
CO5	2	2	2	3	2	1	0	0	0	0	0	2	2	2	3
CO6	2	2	3	3	2	1	1	0	0	0	0	3	3	2	2

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