C. U. SHAH UNIVERSITY
Wadhwan City

FACULTY OF:-Technology and Engineering
DEPARTMENT OF: - Mechanical Engineering
SEMESTER: -V
CODE: - 4TE05ICE1
NAME: – Internal Combustion Engines

TEACHING & EVALUATION SCHEME:-

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
							Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
		Th	Tu	Pr	Total		Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE05ICE1	Internal Combustion Engines	3	0	2	5	4	30	1.5	70	3	---	20	30	**150**

Objectives:

- To understand basic principles of engines used for automobiles and different systems in SI and CI engines.

Prerequisites:

Requires basic knowledge of thermodynamics and Element of Mechanical Engineering.

Course outline:

Sr. No.	Course content	Hours
1.	**Introduction:** Engine classification, Air standard cycles, Otto cycle, Diesel cycle, Dual cycle, Comparison of Otto, Diesel and Dual cycles, Stirling cycle, Ericsson cycles, Actual cycle analysis, Two and four stroke engines, SI and CI engines, Valve timing diagram, scavenging processes & systems, Rotary engines, stratified charge engine.	**05**
2.	**Fuels:** Fuels for SI and CI engine , Important qualities of SI and CI engine fuels, Rating of SI engine and CI engine fuels, Additives, Gaseous fuels, LPG, CNG, Biogas, Producer gas, Alternative fuels for IC engines.	**02**
3.	**Fuel supply systems for S.I & C.I engines::** Fuel supply system for SI engines, properties of air-petrol mixture, mixture requirement for different loads and speeds, simple carburetor 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. 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.	**08**

4.	**Combustion in S.I. & C.I Engines:** 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 chambers for S.I. engines. Stages of combustion, delay period /ignition lag and the factors affecting it, detonation in C.I. engines, factors affecting detonation, controlling detonation, combustion chambers for C.I. engines.	**06**
5.	**Engine Cooling Systems and Lubrication System:** Types of cooling systems, Types of cooling fans, Water pump, Radiators, Thermostat Coolant/anti freeze solution. Functions & types of lubrication systems and it's components including Engine Lubrication circuit Types of Lubricating pumps, Oil coolers, Types of oils, Lubricant properties, additives for lubricants.	**05**
6.	**Intake and Exhaust System:** Objects, Exhaust/Intake systems, types of superchargers. Supercharging of SI and CI engines, effects of supercharging, supercharging limits, methods of supercharging, turbo charging Silencers, Catalytic convertor	**05**
7.	**Ignition system :** Ignition system like battery, magneto, and electronic, spark plug, firing order	**02**
8.	**Emission of pollutants from SI & CI engines:** Control of emissions from SI and CI engines, measurement of pollutants in exhaust gases, effect of different pollutants on human and plant life, emission (Euro & Bharat stage) norms.	**05**
9.	**Engine Performance and Testing:** 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, performance characteristics of SI and CI engines, testing of IC engines as per Indian standard **.**	**07**

Learning Outcomes:

- Student will be able to understand about Construction and operation of IC engine, Fuels and combustion of fuels in SI and CI engine & Engine performance test.
- The Subject helps the student the latest development in field of Automotive Engines.

Text Books:

1. Internal combustion engines **by V.M. Domdundwar**, Dhanpatrai & Co.
2. Internal combustion engines **by Mathur & Sharma** , Dhanpatrai & sons, New Delhi.
3. Internal combustion engines **by V.Ganeshan** (Tata Mc Grawhill pub.co. ltd., New Delhi)

Reference Books:

1. Internal combustion engines **by Ramalingam** (Scitech pub.india pvt. ltd., chennai)
2. Internal combustion engines Fundamentals **by John B Heywood** ,Tata Mc Grawhill pub.co.
3. Internal combustion engines **by H.N. Gupta**, PHI Learning, New Delhi.