Course Type	Course Code	Name of Course	L	T	P	Credit
DC	MEC 307	IC Engines and Gas Turbines	3	0	0	9

Course Objectives

- The course is important for students to understand the basic components, working principles and performance of IC Engines and Gas Turbines.
- The course includes combustion process and related heat transfer in IC engines and gas turbines.
- This course explores applications in automobile industry and gas-operated power plants.

Learning Outcomes

Upon successful completion of this course, students will:

- The introduction to internal combustion engines is based on explaining processes by the application of first principles in thermodynamics, heat transfer, fluid flow etc.
- Through this course, students can gain in depth understanding of the engine components, injection, ignition as well as various stages of combustion inside the spark ignition (S.I) and compression ignition (C.I) engines.
- It also provides some basic knowledge of gas turbines to the students. Besides, students shall gain knowledge about the recent developments in the internal combustion engine technology.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Introduction:** Internal and external combustion engines, classification and nomenclature of I. C. Engines, Air standard Otto, diesel and dual combustion cycles, deviation of actual engine cycle from ideal cycle.	6	To understand the classification of I.C Engines, air standard cycles, Air standard cycles and its comparison of actual engine cycle.
2	**Carburetion and fuel Injection:** Mixture requirements for various operating conditions in S.I. Engines; elementary carburetor, single-point and multi-point fuel injection systems; Diesel injection system.	8	To understand the requirement of a carburetor in an engine, working principles, single/multi point fuel injection systems.
3	**Ignition systems:** Types of ignition systems, advancing ignition timing; spark plugs.	6	To understand the different types of ignition systems such as battery/ magneto ignition systems in engines.
4	**Combustion in I.C. Engines:** Stages of combustion in S.I. Engines, factor influencing the ignition lag and flame speed, detonation and its effects on engine performance, influence of engine variables on detonation, pre-ignition, Stages of combustion in C.I. Engines, delay period, variables affecting delay period, knock in C.I. engines, Lubrication and Cooling Systems.	7	To understand various stages of combustion in S.I and C. I engines, detonation and its effect on the engine performance, Different types of lubrication and cooling systems.
5	**Engine Testing and Performance:** Measurement of various engine performance parameters.	4	To understand the various performance parameters in engines and their calculations to assess the engine performance.
6	**Supercharging:** Objectives of supercharging, its advantages and applications; Turbocharging and supercharging of SI and CI Engines; limitations of supercharging.	5	To understand requirement, objectives and applications of supercharging and turbocharging in S.I and C.I engines.
7	**Gas Turbines:** Brayton cycle, open and closed gas turbine plants, Improvements of the basic gas turbine cycle; reheating and regeneration. Applications of gas turbines, requirements of a gas turbine.	6	To understand the basic gas turbine cycle and its improvement, open/closed gas turbine plants, applications of a gas turbine.

Text books

1. Internal Combustion Engines, V. Ganesan, 4th edition, 2012, Tata McGraw Hill Publication
2. Gas turbine theory-H. Cohen, H.I.H. Saravanamuttoo, G.F.Crogers, Paulstraznicky, Andrew nix, pearson publication,7th edition, 2017

Reference books

1. Fundamentals of Internal Combustion Engines, H.N. Gupta, 2nd edition, 2012, PHI publication
2. Internal Combustion Engine Fundamentals: J.B. Heywood, McGrawhill Book Co., 1988
3. Internal Combustion Engines, M.L. Mathur and R.P. Sharma, 2014 edition, Dhanpat Rai Publication