Gautam Buddha University, Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
Integrated B. Tech. + M. Tech. / M.B.A.	I C Engines & Gas Turbines	ME 309	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
V	4	3-1-0	3 Hours

Unit - I

Air Standard Cycles: Internal and external combustion engines; Classification of I.C. Engines; Cycles of operation in four stroke and two stroke I.C. Engines; Wankel Engines; Assumptions made in air standard cycle; Otto cycle; Diesel cycle; Dual combustion cycle; Comparison of Otto; Diesel and dual combustion cycles; Sterling and Ericsson cycles; Air standard efficiency; Specific work output; Specific weight; Work ratio; Mean effective pressure; Deviation of actual engine cycle from ideal cycle; Problems. **(08 Hours)**

Unit - II

Carburetion; Fuel Injection and Ignition Systems: Mixture requirements for various operating conditions in S.I. Engines; Elementary carburetor; Requirements of a diesel injection system; Types of injection systems; Petrol injection; Requirements of ignition system; Types of ignition systems ignition timing; Spark plugs; Problems. **(07 Hours)**

Unit - III

Combustion in I.C. Engines: S.I. engines; Ignition limits; Stages of combustion in S.I. Engines; Ignition lag; Velocity of flame propagation; Detonation; Effects of engine variables on detonation; Theories of detonation; Octane rating of fuels; Pre-ignition; S.I. engine combustion chambers; Stages of combustion in C.I. Engines; Delay period; Variables affecting delay period; Knock in C.I. engines; Cetane rating; C.I. engine combustion chambers.

(08 Hours)

Unit - IV

Lubrication and Cooling Systems: Functions of a lubricating system; Types of lubrication system; mist; Wet sump and dry sump systems; Properties of lubricating oil; SAE rating of lubricants; Engine performance and lubrication; Necessity of engine cooling; Disadvantages of overcooling; Cooling systems; Air-cooling; Water cooling; Radiators. **(07 Hours)**

Unit - V

Engine Testing; Performance and Air Pollution: Performance parameters: BHP; IHP; Mechanical efficiency; Brake mean effective pressure and indicative mean effective pressure; Torque; Volumetric efficiency; Specific fuel consumption (BSFC; ISFC); Thermal efficiency; Heat balance; Basic engine measurements; Fuel and air consumption; Brake power; Indicated power and friction power; Heat lost to coolant and exhaust gases; Performance curves; Pollutants from S.I. and C.I. Engines; Methods of emission control; Alternative fuels for I.C. Engines; Blending of fuels; Bio Diesel; Multi point fuel injection system (MPFI); EURO- (1-4) series & BHARAT series; Problems. **(09 Hours)**

Unit - VI

Gas Turbines: Brayton cycle; Components of a gas turbine plant; Open and closed types of gas turbine plants; Optimum pressure ratio; Improvements of the basic gas turbine cycle; Multi stage compression with inter-cooling; Multi stage expansion with reheating between stages; Exhaust gas heat exchanger; Applications of gas turbines; Problems. **(06 Hours)**

Recommended Books:

1. Internal Combustion Engines; V. Ganesan; Publication; Tata McGraw-Hill.
2. Gas Turbines; V. Ganesan; Tata McGraw Hill. Engineering fundamental of the I.C.Engine – Willard W. Pulkrabek Publication: Prentice Hall of India.
3. Internal Combustion Engines; Mathur and Sharma; Dhanpat Rai and Sons
4. Internal Combustion Engines & Air pollution; E. F. Obert; Pub.-Hopper & Row Pub.; New York.
5. Internal Combustion Engines Fundamentals; John B. Heywood; Pub. McGraw Hill; New York.