

III Year I Semester

Code: 20ME5707

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THERMAL ENGINEERING

Course Objectives:

The Students will acquire the knowledge:

1. To interpret the actual cycles and their analysis.
2. To discuss the working of IC engines.
3. To outline the systematic understanding of knowledge in combustion in IC engines.
4. To discuss about the testing and performance of IC engines.
5. To summarize the working of various types of compressors.

UNIT-I ACTUAL CYCLES AND THEIR ANALYSIS:

Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blowdown-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles Of CI Engines.

UNIT-II I.C. ENGINES :

Classification - Working principles, Valve and Port Timing Diagrams, Air – Standard, air-fuel and actual cycles - Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication.

UNIT-III COMBUSTION IN S.I. ENGINES:

Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking (explanation of) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

COMBUSTION IN C.I. ENGINES : Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

UNIT-IV TESTING AND PERFORMANCE:

Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart.

UNIT-V COMPRESSORS

Classification –positive displacement and roto dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

RECIPROCATING COMPRESSORS: Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, undercooling, saving of work, minimum work condition for stage compression.

TEXT BOOKS

1. I.C. Engines / V. GANESAN- TMH
2. Thermal Engineering / Rajput / Lakshmi Publications.

REFERENCES:

1. IC Engines – Mathur & Sharma – Dhanpath Rai & Sons.
2. Engineering fundamentals of IC Engines – Pulkrabek / Pearson /PHI
3. Thermal Engineering / Rudramoorthy - TMH
4. Thermodynamics & Heat Engines / B. Yadav/ Central Book Depot., Allahabad
5. I.C. Engines / Heywood /McGraw Hill.
6. Thermal Engineering – R.S. Khurmi & J.K.Gupta – S.Chand
7. IC Engines/ Ramalingam/ Sciotech publishers
8. Thermal engineering data book-B.Srinivasulu Reddy/JK International Pub.

Course Outcomes:

At the end of the course, the student will be able to:

1. Recite the actual cycles and their analysis.
2. Narrate the working of an IC engines.
3. Explain the combustion phenomenon in IC engines.
4. Illustrate testing and performance of IC engines
5. Integrate the knowledge of working of various types of compressors.