

II YEAR II SEM

15AME17-THERMAL ENGINEERING

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Course Objectives

- To make students familiar with the design and operating characteristics of modern internal combustion engines
- To apply analytical techniques to the engineering problems and performance analysis of internal combustion engines
- To study the thermodynamics, combustion, heat transfer, friction and other factors affecting engine power, efficiency and emissions
- To introduce students to the environmental and fuel economy challenges facing the internal combustion engine
- To introduce students to future internal combustion engine technology and market trends

UNIT-I

I.C. Engines : Definition of Engine and Heat Engine, I.C Engine Classification – Parts of I.C. Engines, Working of I.C. Engines, Two Stroke & Four Stroke I.C. Engines SI & CI Engines, Valve and Port Timing Diagrams.

UNIT-II

S.I. Engine: Fuel Supply Systems, carburetor types Air Filters, Mechanical and Electrical Fuel Pump – Filters– Gasoline Injection Systems.

Cooling & Lubrication Systems: Cooling Requirements, Air Cooling, Liquid Cooling, Thermo Siphon, Water And Forced Circulation System, Lubrication Systems-Flash, Pressurized and Mist Lubrication.

Ignition System: Function Of An Ignition System, Battery coil Ignition System, Magneto Coil Ignition System, Electronic Ignition System using Contact Breaker, Electronic Ignition using Contact Triggers – Spark Advance And Retard Mechanism.

UNIT-III**Combustion Of I.C Engines**

S I engine :Normal Combustion and Abnormal Combustion – Importance of Flame Speed and Effect of Engine Variables – Type of Abnormal Combustion, Pre-Ignition and Knocking (Explanation) – Fuel Requirements and Fuel Rating, Anti Knock Additives, Combustion Chambers.

C.I. Engines: Stages Of Combustion – Delay Period And Its Importance – Effect Of Engine Variables – Diesel Knock– Combustion Chambers (DI And IDI), 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

Air Compressors: Reciprocating Compressors, Effect of Clearance volume in Compressors, Volumetric Efficiency, Single Stage and Multi Stage Compressors, Effect of Inter cooling and Pressure Drop in Multi - Stage Compressors, Problems Related to Reciprocating Compressors, Working principles of Roots blower, Vane type Blower, Centrifugal Compressor - Axial Flow Compressors.

- Students are advised to refer the text book of “Internal Combustion Engine Fundamentals” by John B. Heywood.

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. Internal Combustion Engines by K.K. Ramalingam, Scitech Publications.
3. Engineering fundamentals of IC Engines – Pulkrabek, Pearson, PHI
4. Thermal Engineering, Rudramoorthy - TMH
5. Thermodynamics & Heat Engines, B. Yadav, Central Book Depot., Allahabad
6. I.C. Engines, Heywood, McGrawHill.
7. Thermal Engineering – R.S. Khurmi & J.K. Gupta – S.Chand
8. Thermal engineering data book-B.Srinivasulu Reddy, JK International Pub.
9. I.C Engines by S.S Thipse – Jaico

Course outcomes

After Completion of this course the student can be able to:

- Exposure to the engineering systems needed to set-up and run engines in controlled laboratory environments
- Develop skills to run engine dynamometer experiments
- Learn to compare and contrast experimental results with theoretical trends, and to attribute observed discrepancies to either measurement error or modeling limitations
- Develop an understanding of real world engine design issues
- Develop an ability to optimize future engine designs for specific sets of constraints (fuel economy, performance, emissions)

Web Resources

<http://autoclub.rso.siuc.edu/frange.html>

<http://www.howstuffworks.com/engine1.htm>

<http://inventors.about.com/library/inventors/blinternalcombustion.htm>

<http://www.animatedengines.com/>


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