

ATF 121 - Automotive Engines

(02 credits – 50 marks)

Learning Objectives:

1. To penetrate deep into engine classification, construction and operation of I.C. engines with latest technologies.
2. Understand the performance parameters and testing methodologies.

Learning Outcomes:

1. Differentiate the fuel dynamics for SI and CI engines and define the key terms like Supercharging, Turbocharging.
2. To get acquainted with the latest technologies.

Course Content:

Module-I: Introduction to Engines

05 hrs

Introduction, Carnot cycle, Classification, I.C. Engines, Otto cycle, Diesel cycle, Flywheel, performance parameters, Brake Power, Indicated Power, Zeroth law of thermodynamics, First law of thermodynamics, Second law of thermodynamics, Fuel-Air cycles, numerical on performance parameters.

Module- II: Petrol Engines

07 hrs

Engine Construction and Operation: Constructional details of 4-stroke petrol engine. Working principle, actual indicator diagram, Firing order and its significance, Two Stroke Engines: Terminologies and definitions, Theoretical scavenging methods. Effect of operating variables: Compression Ratio, Fuel- Air Ratio, Ignition system, Combustion in petrol engine, morse test, motoring test, willans line method

Module- III: Diesel Engines

07 hrs

Engine construction and operation. Two stroke and four stroke diesel engines. Fuel-air and actual cycle analysis. Diesel fuel, Ignition quality, fuel injection systems, supercharging, turbo charging, Diesel Engine Testing and Performance: Automotive and stationary diesel engine testing, Performance characteristics. Variables affecting engine performance. Methods to improve engine performance. Heat balance.

Module- IV Advanced Engines

05 hrs

Need of advancement in engine, Common Rail Direct Injection Engine, Multi point fuel injection engine, Gasoline Direct Injection engine, Lean burn engines, Homogeneous charge compression ignition engine, variable compression ratio engine, Wankel Engine.

Module -V Tutorials, case studies and presentation based on Module I to IV

06 hrs

References:

1. Internal Combustion Engines, Ganesan.V, Tata McGraw Hill Publishing Co., New York, 4th Edition (2012), ISBN-0-07-049457-6.
2. High Speed Combustion Engines, Heldt.P.M, Oxford Publishing Co., New York, (1990).
3. Automotive Engines, [William H. Crouse](#) (Author), [Donald Anglin](#) (Author), [Donald L. Anglin](#), McGraw-Hill Education (ISE Editions); (1994), ISBN-10: 0071138846, ISBN-13: 978-0071138840.
4. Automotive Engines, Ellinger.H.E, Prentice Hall Publishers (1992).
5. Diesel Engine Operation and Maintenance, Maleev.V.M, McGraw Hill (1974)
6. Dicksee.C.B, Diesel Engines, Blackie & Son Ltd., London (1964)