

PAU3I103 Automotive Thermodynamics
Theory L/T (Hours per week): 3/1, Credit: 3

Module-I (10 hours)

1. Laws of Thermodynamics:

First law analysis of steady and unsteady flow, control volumes, Second Law of Thermodynamics, Entropy generation, Reversible work, Availability, and Irreversibility.

2. Gas Power cycle:

Air standard cycles- Otto, Diesel, Dual Combustion and Brayton cycles, The Brayton cycle with non-isentropic flow in compressors and turbines, The Brayton cycle with regeneration, reheating and intercooling, ideal jet propulsion cycle.

Module-II (08 hours)

3. Vapour Power cycle:

The Carnot vapor cycle and its limitations, The Rankine cycle, Means of increasing the Rankine cycle efficiency, Brief concepts of the binary vapour cycle, the gas-vapor coupled cycles, Cogeneration (Back pressure and Pass-out turbines).

Module- III (10 Hours)

4 . Air Compressors:

Introduction (Uses of compressed air), The reciprocating cycle, Volumetric efficiency and its effect on compressor performance, Limitations of single stage compression, Multistage compression and intercooling, Optimum intercooler pressure, Performance and design calculations of reciprocating compressors, Air motors. Centrifugal and axial flow compressor, blowers and fans: Components, working principles and applications.

5. Refrigeration and Air conditioning:

Principles of refrigeration, Vapour compression and vapour absorption system, COP, properties of refrigerants, Psychrometry, Type of air conditioning systems.

Module- IV (08 Hours)

6. Fuels and Combustion: Fuels: solid, liquid and gaseous, Chemical equations – conservation of mass, First law applied to combustion process, calorific value of the fuel, efficiency of combustion processes, limitations of thermodynamic analysis. Alternative fuels for automobiles

Text Books

1. Basic and Applied thermodynamics, P.K.Nag, TMH publications
2. Engineering Thermodynamics: R.K.Rajput, S. Chand and Co
3. Engineering Thermodynamics by Chattopadhyaya, Oxford
4. Fundamentals of Engineering Thermodynamics, E. Rathakrishnan (PHI)

References

1. Engineering Thermodynamics, Mayhew A and Rogers B, Longman Green and Co Ltd., ELBS Edition, 1990 Reference
2. A course in Thermodynamic and Heat Engine: Kothandaraman and Domkundwar, Dhanpat Rai publication
3. . Applied Thermodynamics: P.L.Balany, Khanna publications