| 3rd Semester | RAU3C002 | Automotive Thermodynamics | L-T-P 3-0-0 | 3 CREDITS |
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## MODULE - I          (10 Hrs.)
**Laws of thermodynamics:**

**First Law of thermodynamics**: Closed system, work done, change in Internal energy, heat transferred during various thermodynamic processes, P-V diagrams. Open system, Thermodynamic analysis of control volume, Conservation of energy principle, the steady flow process applied to (i) Nozzles and Diffuser (ii) Turbines and Compressor, (iii) Throttle valve. Unsteady flow process.

**Second Law of Thermodynamics**: Second law of Thermodynamics Introduction (Law of degradation of Energy) Thermal Energy reservoir, Kelvin-Plank & Clausius Statement, Thermodynamic temperature scale. Entropy: The Clausius Inequality, Entropy, Principle of increase of entropy, Change in entropy for Closed and steady flow open systems. Second law analysis of engineering system, Availability, reversible work and Irreversibility, Basic thermodynamics relations.

## MODULE – II          (5 Hrs.)
**Vapour power cycle:**

The Carnot vapor cycle and its limitations, the Rankine cycle, means of increasing the Rankine cycle efficiency

## MODULE – III          (5 Hrs.)
**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 - IV          (8 Hrs.)
**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.

Refrigeration and air conditioning: principles of refrigeration, Vapour compression and Vapour absorption system, cop, and properties of refrigerants, Psychrometry, and type of air conditioning systems.

## MODULE - V          (8 Hrs.)
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

**Books:**

- Basic and Applied Thermodynamics, P.K.Nag, TMH Publications
- Engineering Thermodynamics by Chattopadhyaya, Oxford
- Fundamentals of Engineering Thermodynamics, E. Rathakrishnan (PHI)

- Engineering Thermodynamics, Mayhew A And Rogers B, Longman Green And Co Ltd., Elbs Edition, 1990 Reference
- A Course in Thermodynamic and Heat Engine: Kothandaraman and Domkundwar, Dhanpat Rai Publication
- Applied Thermodynamics: P.L.Balany, Khanna Publications
- Engineering Thermodynamics: R.K.Rajput, S. Chand And Co

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