Gautam Buddha University, Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
Integrated B. Tech. + M. Tech. / M.B.A.	Applied Thermodynamics	ME 206	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
IV	3	2-1-0	3 Hours

Unit - I

Fuels and Combustion: Classifications of fuels; Combustion in boiler and IC engines; Stoichimetric (or chemically correct) air fuel ratio; Analysis of products of combustion; Conversion of volumetric analysis into gravimetric analysis and vise-versa; Actual weight of air supplied; Use of moles for solution of combustion problems.   **(04 Hours)**

Unit - II

Properties of Steam and Steam Generators: Pure substance constant pressure formation of steam; Steam tables; Steam generators classification; Fire and water tube boilers; Description of – Cochran, Locomotive, Lancashire, Babcock and Wilcox boilers, Stirling boiler; Mountings and accessories; Economizer; Super heater etc; Modern high pressure boilers; Characteristics of high pressure boilers; Advantages of forced circulation; Steam accumulators; Boiler performance-equivalent evaporation; Boiler efficiency.   **(06 Hours)**

Unit - III

Vapour Power Cycles: Simple Rankine cycle; Methods of improving efficiency; Feed water heating (Bleeding); Reheat cycle; Combined reheat regenerative cycle; Ideal working fluid – binary vapour cycle; Combined power and heating cycles.   **(03 Hours)**

Unit - IV

Nozzles: Types and utility of nozzles; Flow of steam through nozzles; Critical pressure and discharge; Area of throat and exit for maximum discharge; Effect of friction; Nozzle efficiency; Supersaturated flow. **(03 Hours)**

Unit - V

Steam Turbines: Impulse Steam Turbines; General description; Pressure and velocity compounding; Velocity diagram and work done; Effect of blade friction on velocity diagram; Stage efficiency and overall efficiency; Reheat factor and condition curve.

Reaction Turbines: Degree of reaction; Velocity diagrams; Blade efficiency and its derivation; Calculation of blade height; Back pressure and extraction turbines and cogeneration; Economic assessment; Methods of attachment of blades to turbine rotor; Losses in steam turbines; Governing of steam turbines; Labyrinth packing. **(08 Hours)**

Unit - VI

Condensers and Compressors: Different types; Dalton's law to condenser problems; Condenser and vacuum efficiencies; Cooling water calculations; Effect of air leakage; Methods to check and prevent air infiltration; Air compressor: stages of compression and efficiency. **(06 Hours)**

Recommended Books:

1. Basic and Applied Thermodynamics; P. K. Nag; Tata McGraw Hill.
2. Heat Engineering; Vasandani and D. S. Kumar; Metropolitan Book Co. Pvt. Ltd.; Delhi.
3. Thermal Engineering; P.L. Ballaney; Khanna Publishers; Delhi.
4. Engineering Thermodynamics: Work and Hest Transfer; Rogers and Mayhew; ELBS Publications.
5. Thermodynamics and Heat Engines Vol. I and II; R Yadav; Central Publishers; Allahabad.
6. Steam Turbine Theory and Practice; W. A. J. Keartan; ELBS Series.