

10 ME 221 APPLIED THERMODYNAMICS – I
II B.Tech II Semester
(with effect from the academic year 2011-2012)

Lectures/Week: 4 Hrs
University Exam: 3 Hrs

Credits: 4
Sessional Marks: 40
End Examination Marks: 60

UNIT – I

Steam properties and steam generators: Properties of steam – use of steam tables – PV, TS, HS diagrams – steam processes – constant volume, constant pressure, Isothermal, Adiabatic and Hyperbolic processes – Throttling expansion.

Steam Generators: Classification of Fire tube and Water tube boilers – Cochran, Babcock and Wilcox, introduction to high pressure boilers – Lamont, Benson –boilers, boiler mountings and accessories. Nuclear Reactors – Introduction, Boiling Water Reactor, Pressurized Water Reactor.

UNIT – II

Steam Engines: Basic steam power cycles – Carnot cycle and ranking cycle – Modified ranking cycle – principles of operation of steam engine condensing – non-condensing – single & double acting – hypothetical and actual indicator diagrams – diagram factor determination of cylinder dimensions.

UNIT – III

Steam Nozzles: Type – isentropic flow of steam through nozzles – velocity & enthalpy drop – variation of velocity – area – specific volume – critical pressure ratio for maximum discharge effect of friction – super saturated flow.

Steam Condensers: Functions of a condenser – classification – jet condenser – parallel flow and counter flow – surface condenser – vacuum efficiency – loss of vacuum & air leakage – air removal.

UNIT – IV

Steam Turbines: Principles of operation-classification-impulse and reaction turbines-velocity diagrams-work done-diagram efficiency-effect of blade friction-stage efficiency turbine reheat factor-height of turbine blade-axial thrust-losses in steam turbine-governing of turbines-reheat and regenerative cycles.

UNIT – V

Non-Conventional Energy: Various Non-Conventional energy resources, availability, classification, relative merits and demerits.

Solar Thermal Energy and its conversion: Introduction to Solar Radiation, Collectors – Flat Plate, Focusing type, Space heating and cooling, Solar distillation, Solar pumping, Solar cooking, Green houses, Photo-voltaic cell, Solar pond.

Wind Energy: Introduction, Types of Wind mills – Horizontal axis, Vertical axis, Applications.

Working principles of – OTEC, Tidal, Geothermal, and Magneto Hydro Dynamics.

TEXT BOOKS:

1. Heat Engineering : Vasandani V.P and Kumar D.S.
2. Heat Engines : Ballaney P.L.
3. Non Conventional Energy Sources : G D Rai

REFERENCE:

1. A course in Thermal Engineering : Domukundwar & Kothandaraman
2. Thermal Engineering : R.S.Kurmi & J.K.Gupta
3. Thermal Engineering : R.K. Rajput