Electives

Basic Mechanical Engineering L – P
MEC-G01T 3 – 0

UNIT I

Thermodynamics: System and Surroundings, Zeroth Law, Temperature Scales, Equation of the state, First Law, Steady flow, isochoric, isobaric, isothermal, adiabatic and polytrophic processes, Properties of steam.

UNIT II

Second Law of Thermodynamics & power cycles: Second law, Entropy change, Reversible irreversible processes, Carnot's Cycle, Ranking Cycle, Modified Rankine Cycle, and Flow through nozzle.

UNIT III

Steam Turbine: impulse turbine, velocity and pressure compounding, work output, Losses and efficiency. Reaction turbine, work output, losses and efficiency, degree of reaction. Modern steam power cycles, Regenerative and Reheat cycles, Governing of Steam Turbines, Fields of Application.

UNIT IV

IC Engines: Otto, Diesel and Duel cycles, Magneto and battery ignition, detonation and pre-ignition, octane Number, Cetane Number, various IC engines fuels, Carburation and Injection, Lubrication, cooling, Governing of IC Engines, Fields of Application.

UNIT V

Gas Turbines: Present status and future trends, Basic types and Cycles, Thermal refinements, jet propulsion, fields of Application.

Books Recommended:

1. Basic Mechanical Engineering by Basant Agrawal, John Wiley & Sons, 2008
2. Engineering Thermodynamics by D.S Kumar.
3. Basic Mechanical Engineering by Pravin Kumar, Pearson Education India.

Other resources:

1. Online Lecture Notes: http://ronney.usc.edu/AME101/AME101-LectureNotes.pdf

Electives

Power Plant Engineering — L – P
MEC-E01T — 3 – 0

Unit I

Fuels and Combustion: Thermodynamic cycle of steam flow: Rankine cycle, Actual Rankine cycle, Reheat cycle, Carnot cycle, heat rate, Classification of fuels, calorific value and its determination.

Unit II

Combustion chemistry: Bomb calorimeter, Boy's gas calorimeter, combustion equation, stoichiometric air fuel ratio, excess air requirement, actual air fuel ratio, flue gas analysis, pulverized coal firing system, fluidized bed combustion.

Unit III

Thermal Power Plants: Types of boilers, Feed water and its treatment, Steam turbine and alternators, Site selection, Main parts and its working, Fuel handling, delivery of load, unloading, preparation, transfer, storage.

Unit IV

Hydroelectric Power Plants: General layout and arrangement of Hydroelectric power plants, Types of turbines, description and principles of impulse and reaction turbines, turbine characteristics, selection of turbines, governing of turbines.

Unit V

Diesel Power Plants: Main components and its working, Diesel plant efficiency and heat balance, characteristics and selection of diesel power plant.

Nuclear Power Plants: Introduction, atomic physics and nuclear reactions, materials and site selection, nuclear reactors and working of each part. Layout and classification of nuclear power plants, nuclear waste disposal.

Books Recommended:

1. Power Plant Engineering, 4e, P. K. Nag, McGraw-Hill Education, 2014.
2. Power Plant Engineering by Hegde R. K., Pearson Education India, 2015.

Electives

MATLAB for Engineers — L – P
MEC-E02P — 0 – 3

UNIT I

Basics of MATLAB, MATLAB windows, Arithmetic calculations, use of variables, arrays, matrix & Array operations; Arithmetic, Relational & Logical Operations, Elementary math functions, character settings, saving & loading data, Mat-files, Matrix functions.

UNIT II

Programming in MATLAB, Script files, Function files, Global variables, Loops, branches & control flow, interactive input, graphics: 2-D & 3-D plots, style options, titles, axes control, zoom.

UNIT III

Curve fitting, Interpolation, Eigen values & Eigen Vectors.

Books Recommended:

1. Getting Started With Matlab: A Quick Int, Pratap, Oxford University Press, 2010.
2. MATLAB programming for Engineers, Fifth Edition, Stephen J Chapman, Cengage Learning.

Electives

Hydraulics & Hydraulic Machines — L – P
MEC-E03T — 3 – 0

UNIT I

Fluid Statics: Physical properties of Fluids, Pressure Intensity, Pascal's law, pressure density height relationships, manometers, pressure on plain and curved surfaces, centre of pressure.

UNIT II

Kinematics of Fluid Flow: Types of flows, stream lines, streak lines, path lines. Continuity equation. Dynamics of fluid Flow: Euler's equation of motion along a stream line and its integration to yield Bernoulli's equation. Flow measurement, Pitot tube, Venturimeter, orifice meter, Orifices, Weirs and Notches.

UNIT III

Flow through pipes: Hydraulic grade line, Darcey-weisbatch formula, Design of pipes, Equivalent diameter of pipes, Transmission of power through pipes.

UNIT IV

Flow in open Channels: Chezy's formula, Manning's formula, Design of Cannels and Economic Section.

UNIT V

Hydraulic Machines: General layout and arrangement of Hydroelectric power plants, Types of turbines, description and principles of impulse and reaction turbines, unit quantities and specific speed, run away speed, turbine characteristics, selection of turbines, governing of turbines. Pumps: Types of Pumps, centrifugal pumps, reciprocating pumps.

Books Recommended:

1. Fluid Mechanics, Hydraulics And Hydraulic Machines by K. R. Arora, 9th Edition, reprint, Standard Publishers Distributors, 2005
2. Hydraulics and Hydraulic Machines by Madan Mohan Das, Mimi Das Saikia, Bhargab Mohan Das, PHI Learning Pvt. Ltd., 2013.
3. Fluid Mechanics & Fluid Power Engineering; Dr D. S. Kumar, Kataria, 2013.