

II Year I Semester
Code: 17ID304

L T P C
4 1 0 3

**BASICS OF MECHANICAL, ELECTRICAL
AND ELECTRONICS ENGINEERING**

Course Learning Objectives:

1. To learn the basic principles of electrical law's and analysis of networks.
2. To understand the principle of operation and construction details of DC machines.
3. To understand the principles and construction of various measuring instruments.
4. To study the operation of PN junction diode, half wave, full wave rectifiers and OPAMPs.
5. To learn the operation of PNP and NPN transistors and various amplifiers.

Course Outcomes:

After completing the course, the student shall be able to understand

- Working of IC engines
- Modes of Heat transfer
- Power transmission by drives and different manufacturing methods.
- Able to analyse the various electrical networks.
- Able to understand the operation of DC generator, DC Motor, 3-point starter and Speed control methods.
- Able to explain the operation of 3-phase alternator and 3-phase induction motors.
- Able to explain the working principle of various measuring instruments.
- Able to analyse the operation of half wave, full wave rectifiers and OP-AMPs.
- Able to explain the single stage CE amplifier and concept of feedback amplifier

SYLLABUS

UNIT I

Energy sources:

Renewable and non renewable energy sources, renewable energy forms and conversions. Thermodynamic principles and laws. Internal combustion engines: classification – working principle – engine components. Four stroke and two stroke petrol and diesel engines, comparisons Performance parameters: IP, BP, FP, SFC, BTE, ITE, ME.

UNIT II

Transmission of power and manufacturing methods:

Belt, rope and chain devices – different types – power transmission by belts and ropes, initial tensions in the belt. Gears: classification of gears, applications- Metal joining: arc welding, resistance welding, gas welding, brazing and soldering Metal forming: forging – operations, rolling and extrusion principles Machine tool: lathe classification, specifications, and operations

UNIT III

DC Machines:

Principle of operation of DC generator – e.m.f equation – OCC of DC generator types of DC machines – torque equation of DC motor – applications – three point starter, speed control methods.

UNIT IV

AC Machines and Various Meters:

Principle of operation of single phase transformers – e.m.f equation – losses – efficiency and regulation – Principle of operation of alternators – Principle of operation of 3-Phase induction motors – slip – efficiency – Deflection, controlling & damping torques, ammeter, voltmeter & wattmeter, MI & MC instruments.

UNIT V

Rectifiers & Linear ICs:

PN junction diodes, diode applications (Half wave and bridge rectifiers). Characteristics of operation amplifiers (OP-AMP) – application of OP-AMPs (inverting, non inverting, integrator and differentiator).

UNIT VI

Transistors:

PNP and NPN junction transistor, transistor as an amplifier, single stage CE Amplifier, frequency response of CE amplifier, concepts of feedback amplifier.

Text Books:

1. Electronic Devices and Circuits by R. L. Boylestad and Louis Nashelsky, PEI/PHI 2006.
2. Electrical Technology by Surinder Pal Bali, Pearson Publications.
3. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group
4. Elements Of Mechanical Engineering by M.L. Mathur, F.S. Mehetha, R.P. Tiwari, Jain Brothers, 2009.

References:

1. Basic Electrical Engineering by M. S. Naidu and S. Kamakshiah, TMH Publications
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications
3. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications
4. Industrial Electronics by G. K. Mittal, PHI