I Year II Semester	L	T	P	C
Code: 17BE201	3	1	0	3

ELECTRICAL & MECHANICAL TECHNOLOGY

ELECTRICAL TECHNOLOGY:

Preamble:

This course covers the topics related to analysis of various electrical circuits, operation of various electrical machines, various electronic components to perform well in their respective fields.

Learning Objectives:

- To learn the basic principles of electrical law's and analysis of networks.
- To understand the principle of operation and construction details of DC machines.
- To understand the principle of operation and construction details of transformer.
- To understand the principle of operation and construction details of alternator and 3-Phase induction motor.
- To understand the principles and construction of various measuring instruments.

Unit – I

DC Machines:

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

Transformers: Principle of operation of single phase transformers – e.m.f equation – losses – efficiency and regulation.

Unit – II

AC Rotating Machines:

Principle of operation of alternators – regulation by synchronous impedance method –principle of operation of 3-Phase induction motor – slip-torque characteristics - efficiency – applications.

Unit III

Measuring Instruments:

Classification – Deflection, controlling, damping torque, ammeter, voltmeter, wattmeter, MI, MC instruments –Energy meter – Construction of CRO.

Learning Outcomes:

- Able to analyze the various electrical networks.
- Able to understand the operation of DC generator, DC Motor ,3-point starter and Speed control methods.
- Able to analyze the performance of transformer.
- Able to explain the operation of 3-phase alternator and 3-phase induction motors.
- Able to explain the working principle of various measuring instruments.

MECHANICAL TECNOLOGY

Learning Objectives: The content of this course shall provide the student the basic concepts of various mechanical systems and exposes the student to a wide range of equipment and their utility in a practical situation. It shall provide the fundamental principles of fuels, I.C. Engines, transmission systems, heat transfer fundamentals and various manufacturing operations usually exist in any process plant.

UNIT-IV:

Energy Sources: Renewable and non renewable energy resources, 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-V:

Heat Transfer: Modes of heat transfer- heat transfer parameters, various thermo physical properties. Conduction -heat transfer for extended surfaces, Types of fins, Fin equation for rectangular fin, Fin efficiency, Fin effectiveness. Convection – Mechanism, Natural and Forced Convection. Heat Transfer in laminar and turbulent flow over a flat plate. Radiation heat transfer: Thermal radiation, Blackbody radiation, Radiation intensity, Radioactive properties, Basic laws of radiation.

UNIT-VI:

Transmission of power and manufacturing methods:

Belt, rope and chain drives- 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.

Outcomes:

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

- Working of I.C. Engines
- Modes of Heat transfer
- Power transmission by drives and different manufacturing methods.

Text Books:

1. Electrical Technology by Surinder Pal Bali, Pearson Publications.
2. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor &Francis Group
3. Mechanical Engineering Science K R Gopala Krishna, Subhas publications
4. Elements of Mechanical Engineering, M.L. Mathur, F.S.Metha&R.P.Tiwari Jain Brothers Publs., 2009**.**
5. Heat transfer by P.K. Nag, Tata McGraw-Hill

Reference Books:

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah, TMH Publications
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition
3. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition
4. Electrical Engineering – Prasad, Sivanagaraju, Cengage Learning
5. Theory of machines by Rattan McGraw-Hill publications
6. Production Technology by P.N.Rao by I& II McGraw-Hill publications