

**I Year II Semester**

**L T P C**

**Code: 20ES2004**

**3 0 0 3**

## **ELECTRICAL AND MECHANICAL TECHNOLOGY**

### **Course Objectives:**

1. To emphasize the fundamental concepts and overview of basic electrical circuits, ac and dc machines.
2. To understand the principles of Systems of Force and Machine Tools

### **Course Outcomes:**

A student who successfully fulfils this course requirement will be having:

1. An ability to apply fundamental laws of electric circuits to analyse simple ac circuits in steady state and the requirement of transformers.
2. An ability to identify the type of DC machines used for particular application.
3. An ability to identify the type of AC machines used for particular application.
4. An ability to understand the systems of Force and their Equilibrium.
5. An ability to understand different Metal Joining, Forming and Tools.

### **UNIT–I: Electric Circuits and Transformers**

Ohm's law, Kirchhoff's laws, electric elements (R, L, C), AC supply, sinusoidal waveforms, Power Triangle, Transformer operating principle, construction, EMF equation, losses, efficiency, applications. Numerical problems (elementary level)

### **UNIT–II: DC Machines**

DC generator operating principle, EMF equation, DC shunt generator characteristics (No-load & load), DC motor operating principle, torque equation, 3-point starter, speed control by flux and armature voltage control methods, Numerical problems (elementary level).

### **UNIT–III: AC Machines**

3-Phase Alternators: operating principle, EMF equation, applications. 3-Phase Induction Motor: operating principle, slip, torque equation, efficiency, applications, numerical problems (elementary level).

### **UNIT–IV**

**Systems of Forces:** Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

**Equilibrium of Systems of Forces:** Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces, LAMI's Theorem.

### **UNIT–V**

**Metal Joining:** Arc welding, Resistance welding, Gas welding, Brazing and Soldering

**Metal Forming:** Forging – operations, rolling and extrusion principles

**Machine Tools:** Lathe – Classification - Turning - Taper turning – Thread cutting

**Text Books:**

1. Basic Electrical Engineering – Ashfaq Hussain ,S.Chand Publications.
2. Electrical Technology-Vol.2 – A.K.Theraja, B.L.Theraja , S.Chand Publications.
3. Electrical Machines – P.S. Bhimbra, Khanna Publishers
4. Engineering Mechanics –S.Timoshenko&D.H.Young, 4<sup>th</sup> Ed., Mc Graw Hill
5. Manufacturing Technology-Vol.I–P.N.Rao, TMH

**Reference Books:**

1. Theory & Performance of Electrical Machines –J.B.Guptha, S.K.Kataria& Sons Publishers.
2. Electrical Machines –R.K.Rajput, 5<sup>th</sup> ed., Lakshmi Publications
3. Singer's Engineering Mechanics: Statics and Dynamics – K. Vijay Kumar Reddy, J. Suresh Kumar, BS Publications.
4. Production Technology – P. C. Sharma, S. Chand Publications.