BEEG 1001: BASIC ELECTRICAL ENGINEERING

Credits: 04 **L-T-P-J:3-1-0-0**

Module No.	Content	Teaching Hours
I	DC circuit analysis & Network theorems: Fundamentals of electric circuits, Kirchhoff's laws, mesh analysis, nodal analysis, Thevenin's theorem, maximum power transfer theorem, superposition theorem. Steady state AC analysis: AC fundamentals, average & rms values of different AC waveforms, phasor algebra, analysis of series AC circuits, power triangle, concept of power factor. Three phase AC circuits: Generation & advantages of three phase system, star & delta connection, line & phase voltage/current relations.	20
II	Magnetic circuits: Faraday's law, circuit analysis, analogy between magnetic and electric circuit, magnetic hysteresis. Single phase Transformers: : Constructional feature, Working Principle, EMF equation, Ideal transformer, Equivalent Circuit, Phasor diagram, parameter evaluation using O.C & S.C test, efficiency, voltage regulation. Rotating Electrical Machines: DC Machine: Construction, Operating principle, Need of Starter, EMF Equation, Types of DC Motor, Torque Equation, Torque-speed Characteristics and applications. Induction motor: 3-phase: Construction & Principle, Need of Starter, Torque Equation, Torque-slip Characteristics. Single Phase Induction motor: Principle and Starting methods.	22

Text Book:

• D.C. Kulshrestha, "Basic Electrical Engineering", Tata McGraw Hill.

Reference Books:

• T.K. Nagsarkar&M.S.Sukhija, "Basic Electrical Engineering", Edition 2008, Oxford University Press.
• H. Cotton, "Advanced Electrical Technology", 2nd Edition 2009, Wheeler Publishing.
• I. J. Nagarath, "Basic Electrical Engineering", 2nd Edition, Tata McGraw Hill.
• D. E. Fitzgerald & A. Grabel Higginbotham, "Basic Electrical Engineering", 5th Edition, McGraw Hill.
• Edward Hughes, "Electrical Technology", 3rd Edition, Pearson Education.

Outcome: *After completion of course, students will be able to:*

1. *Define the basic concept of Active and Passive elements, Linear & non-linear elements, Unilateral and Bilateral Elements. Sources-Ideal & Practical voltage and current sources.*
2. *Explain the concept of KVL/KCL and can calculate the current, voltage and power by using nodal method, mesh method, Thevenin's theorem, Super position Theorem and Maximum power transfer theorem.*
3. *To evaluate the steady state behavior of single phase and three phase AC electrical circuits.*
4. *Analyze the Magnetic circuit, principle of operation and efficiency of transformer.*
5. *Analyze the components of low voltage electrical installation.*
6. *Explain the various machines like DC Machine, Induction motor and synchronous motor in terms of working principle and applications.*