# 20EE1102 - BASIC ELECTRICAL ENGINEERING

(Common to CSE, IT and AI&DS)

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| **Course Category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3-0-0 |
| **Prerequisite:** | Fundamental concepts of Electricity and electromagnetic induction. | **Sessional Evaluation:**  **Univ. Exam Evaluation:**  **Total Marks:** | 40  60  100 |
| **Objectives** | Students undergoing this course are expected to learn:   * The basic concepts of DC circuits and network reduction techniques. * The DC circuit analysis and Network Theorems. * The basic concepts of AC circuits * The construction and working principle of the transformers. * The operation of three phase Induction motor and draw the equivalent circuit. * The operation of PMMC and Moving coil instruments. | | |

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| **Course Outcomes** | Upon successful completion of this course students will be able to: | |
| CO1 | Comprehend the fundamental concepts of DC circuits. |
| CO2 | Perform the DC circuit analysis by Nodal, Mesh analysis and Network theorems. |
| CO3 | Analyze the single-phase A.C circuits. |
| CO4 | Acquire the knowledge about the transformers. |
| CO5 | Know the operation of three phase Induction motor draw the equivalent circuit. |
| CO6 | Understand the basics of measurements and working of PMMC & Moving Iron instruments. |
| **Course Content** | UNIT - I  **Fundamentals of electric Circuits:** Introduction, Classification of network elements, Voltage-Current relations for passive elements, Kirchhoff's laws, Series-Parallel connection, Source Transformation-Star-Delta transformation, Simple problems.    UNIT - II  **D.C. Circuits:** Mesh and Nodal Analysis with independent sources – Numerical problems.  **Network Theorems**: Super-position, Reciprocity and Thevinin’s Theorem with independent sources, Simple problems.  UNIT - III  **A.C. Circuits**: Representation of sinusoidal waveforms, peak, average and RMS values, Real power, reactive power, apparent power, power factor, Analysis of single-phase AC circuits consisting of R, RL, RC, RLC combinations (series and parallel), Simple problems.  UNIT - IV  **Transformers:** Construction andPrinciple of operation, Ideal transformer and practical transformer, Losses, OC & SC tests, Efficiency and Regulation (All the above topics are elementary treatment), simple problems.  UNIT - V  **Three phase Induction motors**: Construction and Principle of operation, slip and rotor frequency, torque equation, determination of equivalent circuit parameters by no-load and blocked rotor tests, simple problems.  UNIT - VI  **Measuring Instruments:** Introduction, classification of instruments, operating principles, essential features of measuring instruments, Moving coil permanent magnet (PMMC) and Moving Iron instruments (Voltmeters and Ammeters). | |
| **Text Books and References** | Text Books:   1. “Basic Electrical Engineering”, by D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill. 2. “Basic Electrical Engineering”, by M.S .Naidu and S.Kamakshaiah - TMH. 3. “Circuits & Networks”, by A. Sudhakar and Shyam Mohan, 5th edition (2015), TMH. | |
| Reference Books:   1. “Network Analysis”, by M.E Van Valkenburg, Third edition, PHI learning private Limited, 2006. 2. “Fundamentals of Electric circuits”, by Charles k Alexander, Mathew N O Sadiku, Tata McGraw Hill Education Private Limited, sixth edition,2017. 3. “Circuits & Systems”, by Dr K. M. Soni, S. K. Kataria & sons Publication, Eleventh edition, Reprint 2016. | |
| **E-Resources** | 1. <http://nptel.ac.in/courses> 2. <http://iete-elan.ac.in> 3. <http://freevideolectures.com/university/iitm> | |