

**DR. A.P.J. ABDUL KALAM TECHNICAL
UNIVERSITY, LUCKNOW**



**EVALUATION SCHEME & SYLLABUS
FOR**

B. TECH. I YEAR

Subject: ELECTRICAL ENGINEERING

Session: 2020-21]

KEE-101T KEE-201T	ELECTRICAL ENGINEERING	3L:0T:0P	3 Credits
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Unit	Topics	Lectures
I	DC Circuits : Electrical circuit elements (R, L and C), Concept of active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, Kirchhoff's laws, Loop and nodal methods of analysis, Star-delta transformation, Superposition theorem, Thevenin theorem, Norton theorem.	8
II	Steady- State Analysis of Single Phase AC Circuits: Representation of Sinusoidal waveforms – Average and effective values, Form and peak factors, Concept of phasors, phasor representation of sinusoidal varying voltage and current. Analysis of single phase AC Circuits consisting of R, L, C, RL, RC, RLC combinations (Series and Parallel), Apparent, active & reactive power, Power factor, power factor improvement. Concept of Resonance in series & parallel circuits, bandwidth and quality factor. Three phase balanced circuits, voltage and current relations in star and delta connections.	8
III	Transformers: Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.	8
IV	Electrical machines: DC machines: Principle & Construction, Types, EMF equation of generator and torque equation of motor, applications of DC motors (simple numerical problems) Three Phase Induction Motor: Principle & Construction, Types, Slip-torque characteristics, Applications (Numerical problems related to slip only) Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications. Three Phase Synchronous Machines: Principle of operation of alternator and synchronous motor and their applications.	8
V	Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Importance of earthing. Types of Batteries, Important characteristics for Batteries. Elementary calculations for energy consumption and savings, battery backup.	8

Text Book:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", McGraw Hill.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill.
3. Ritu Sahdev, "Basic Electrical Engineering", Khanna Publishing House.
4. S. Singh, P.V. Prasad, "Electrical Engineering: Concepts and Applications" Cengage

Reference Books:

1. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press.
3. V. D. Toro, "Electrical Engineering Fundamentals", Pearson India.

Syllabus for Electrical Engineering Lab

KEE-151P KEE-251P	ELECTRICAL ENGINEERING LAB	0L:0T:2P	1 Credit
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SUGGESTIVE LIST OF EXPERIMENTS

(A) Hardware based experiments

1. Verification of Kirchhoff's laws.
2. Verification of Superposition and Thevenin Theorem.
3. Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor
4. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.
5. Connection and measurement of power consumption of a fluorescent lamp (tube light).
6. Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor for star as well as delta connected load.
7. Determination of parameters of ac single phase series RLC circuit.
8. To observe the B-H loop of a ferromagnetic material in CRO.
9. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase transformer.
10. Determination of efficiency of a dc shunt motor by load test.
11. To study running and speed reversal of a three phase induction motor and record speed in both directions.
12. Demonstration of cut-out sections of machines: dc machine, three phase induction machine, single phase induction machine and synchronous machine.

(B) Experiments available on virtual lab

1. Kirchhoff's laws.
Virtual lab link: <http://vlab.amrita.edu/?sub=3&brch=75&sim=217&cnt=2>
2. Thevenin Theorem.
Virtual lab link: <https://vlab.amrita.edu/?sub=1&brch=75&sim=313&cnt=1>
3. RLC series resonance.
Virtual lab link: <https://vlab.amrita.edu/?sub=1&brch=75&sim=330&cnt=1>
4. Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor for star as well as delta connected load.
Virtual lab link: <http://vp-dei.vlabs.ac.in/Dreamweaver/measurement.html>
5. Determination of parameters of ac single phase series RLC circuit.
Virtual lab link: <https://vlab.amrita.edu/?sub=1&brch=75&sim=332&cnt=1>
6. To observe the B-H loop of a ferromagnetic material in CRO.

Virtual lab link: <https://vlab.amrita.edu/?sub=1&brch=282&sim=1507&cnt=2>

7. Determination of the efficiency of a dc motor by loss summation method(Swinburne's test). Virtual lab link: <http://em-iitr.vlabs.ac.in/exp5/index.php?section=Theory>