

**BASIC ELECTRICAL ENGINEERING**  
**BE 1<sup>st</sup> SEMESTER (EC/CE/ CIVIL) / BE 2<sup>nd</sup> SEMESTER (ME/IT/EE/ AE)**  
**SUBJECT CODE: -CC102**  
**Teaching Scheme (Credits and Hours)**

**LEARNING OBJECTIVES:**

Teaching Scheme				Total Credit	Evaluation Scheme					
Lect Hrs	T Hrs	Prac. Hrs	Total Hrs		Theory		Midsem exam	CIA	Pract	Total
					Hrs	Marks	Marks	Marks	Marks	Marks
04	00	02	06	05	03	70	30	20	30	150

The educational objectives of this course are

- To present a problem oriented introductory knowledge of Electrical Engineering Fundamentals.
- To focus on the study of electrical parameters & different engineering application based principles.
- To address the underlying concepts & methods behind Electrical Engineering.
- To identify & formulate solutions to problems relevant to any discipline of engineering through the application of electrical engineering theory, tools & techniques.

**Outline of Course:**

Sr.No.	Title of Unit	Lecturers
1	An Introduction to D.C. Circuits	8
2	Work, Power and energy	4
3	Electrostatics & Capacitance	8
4	Electromagnetic	8
5	AC Fundamentals	8
6	Analysis of A.C. Circuit	10
7	Polyphase Circuits	10
8	Multimeter and Cathod Ray Oscilloscope (CRO)	4

**Total Hours (Theory): 60 , Total Hours (Lab): 30 , Total Hours: 90**

**Detailed syllabus**

Unit No	Topics	Lectures (Hours)	Weightage in %
1.	<b>An introduction to D.C. Circuits:-</b> Introduction, Modern electron theory, Electric Potential and Potential difference, Resistance, Computation of Resistance, Conductance, Effect Of Temperature upon Resistance, Computation of resistance at different temperatures, Computation of $\alpha$ at different temperature, Ohm's law, Solutions Of series, parallel in brief, star-delta combination of Resistances, KVL & KCL for Resistive circuit.	08	13
2.	<b>Work, Power, Energy :-</b> Heating Effect of Electric Current and Joule's law – Thermal Efficiency- Electrical Units of Power and Energy - Mechanical Units of Force- Torque & Power - Calculation of Power & Energy – Energy Bill.	04	8
3.	<b>Electrostatics &amp; Capacitance:-</b> Definitions of Electrostatic, Coulomb's law, types of capacitors, series, parallel combinations & related circuit calculations in brief charging & discharging of capacitor. Energy stored in capacitor.	08	14
4.	<b>Electromagnetic:-</b> Faraday's law, lenz's law, Magnetic Circuit, Comparison Between Electric And Magnetic Circuits ,Series/Parallel Magnetic Circuit Calculations, Magnetic Hysteresis, Hysteresis And Eddy Current Loss, Magnetic Materials, Electromagnetic induction, Statically And Dynamically Induced E.M.F.S in brief, Fleming's Right hand rule-Left hand rule, Coefficients Of Self And Mutual Inductances , Coefficient Of Coupling, Series/Parallel Combinations Of Inductances, Rise And Decay Of Current In Inductive Circuits , Force Experienced By Current Carrying Conductor Placed In Magnetic Field.	08	13
5.	<b>AC Fundamentals:-</b> Introduction, Definitions, generation of Alternating emf, equation of alternating voltage (emf), different forms of emf equation, Avg. value, RMS value, form factor, crest factor, phase and phase difference, Vector representation of alternating quantity	08	14
6.	<b>Analysis of A.C. Circuit:-</b>	10	15

	Purely resistive, Inductive and capacitive circuits. R-L series circuits, Power in a.c. circuits, R-C series circuits, R-L-C series circuits, resonance in R-L-C series circuits, solution of parallel circuits. Resonance in parallel a.c. circuits.		
7.	<b>Polyphase Circuits:-</b> Generation Of Poly phase Voltages, 3, Phase System, Phase Sequence, Inter Connection Of 3 Phases, Voltage, Current And Power Relationships In Balanced Three Phase Circuits, Power Measurement In Single Phase And 3 Phase Circuits.	10	15
8.	<b>Multimeter and Cathod Ray Oscilloscope (CRO):-</b> multimeter, Cathod Ray tube, working of CRT, block diagram of CRO, Use of CRO in measurement	04	8
<b>Total</b>		<b>60</b>	<b>100</b>

#### Instructional Method and Pedagogy

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory, which may carry five marks in overall evaluation.
- One internal exam of 30 marks is conducted as a part of Mid semester evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry a weight age of five marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar /Tutorial may be conducted and having share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

#### Student Learning Outcome:

On successful completion of the course

- The student can be acquired the basic knowledge of electric circuits, electrical fundamentals, thus being prepared to pursue any area of engineering spectrum in depth as desired.
- The students will be able to effectively employ electrical systems and lead the exploration of new applications and techniques for their use.

#### Text Books:

- Vincent, Del Toro, Electrical Engineering Fundamentals, PHI
- Theraja, B L, Electrical Technology: Vol I, S. Chand
- Mittal, V.N. & Mittal Arvind, Basic Electrical Engineering, TMH, 2nd Edition
- Bobrow Leonard S., Fundamentals of Electrical Engineering, Oxford Uni. Press

#### Reference Books:

- Sharma, Mulukutla, Introduction to Electrical Engineering, Oxford Uni. Press
- Basic Electrical Technology-Version 2, IIT Kharagpur
- Bird John, Electrical and Electronic Principles and Technology, Newnes, (3rd Edition)
- Christopher Robertson, Fundamental Electrical & Electronic Principle, Newnes, (3rd Edition)

#### Web Materials:

- <http://www.wikipedia.org>
- <http://hyperphysics.phy-astr.gsu.edu/hbase/Electronic/etroncon.html>
- <http://www.facstaff.bucknell.edu/mastascu/eLessonsHTML/EEIndex.html>

#### Recommended list of experiments:

Sr. No.	Name of experiment
1.	To observe the effect of temperature on resistance of winding.
2.	Verification of Kirchhoff's laws using resistive circuits.
3.	To observe series and parallel combination of Resistor.
4.	To observe series and parallel combination of Inductor.
5.	To observe series and parallel combination of Capacitor.
6.	To observe charging and discharging of Capacitor.
7.	To observe rise and decay current in inductor.
8.	To Obtain the Hysteresis Loop of a Magnetic Material.
9.	Measurement of Inductance and Power factor in an R-L Series Circuit.
10.	Measurement of Capacitance and Power factor in an R-C Series Circuit.
11.	Measurement of Power factor in R-L-C series circuit.
12.	Measurement of resonance frequency in R-L-C series circuit.
13.	Measurement of the electrical power in a single phase AC circuit by using Wattmeter.
14.	Verify the relationships between line and phase quantities in Star and Delta connections.
15.	To study Cathode Ray Oscilloscope (C.R.O.) and measure the Electrical quantities.
16.	To Audit of Energy bill.