FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

II Semester: CSE / IT								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AEE001	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	1	-	4	30	70	100
Contact Classes: 45	**Tutorial Classes: 15**	**Practical Classes: Nil**				**Total Classes: 60**		

I. COURSE OVERVIEW:

This course introduces the concepts of basic electrical engineering parameters, quantities, analysis of DC circuits. The course teaches different fundamental laws Ohms laws, Kirchhoff laws and different electrical concepts. The students will be able to analyze networks using graph theory and circuit theorems like Thevenin's and Norton's theorems. It also describes the concept of AC circuits and their applications.It also describes introduction to three phase circuits and the concept of semiconductor diodes, bipolar junction transistors and their applications.

II. OBJECTIVES:

The course should enable the students to:

I   The fundamentals of electrical circuits and analysis of circuits with DC excitationusing circuit laws.

II   The application of circuit laws in network theorems and graph theory to simplifycomplex networks.

III Analyze series and parallel AC circuits using complex notation.

IV   Illustrate the V-I characteristics of various diodes and bi-polar junction transistor.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1 **Solve** complex electrical circuits by applying network reduction techniques for reducing into a simplified circuit.   Apply

CO 2 **Make use of** various network theorems and graph theory forsimplifying complex electrical networks.   Apply

CO 3 **Define** basic nomenclature of single phase AC circuits for obtaining impedance, admittance of series and parallel circuits.   Remember

CO 4 **Interpret** the power factor in single phase circuits with various combinations of network elements for computing active and reactivepower.   Understand

CO 5 **Apply** the PN junction characteristics for the diode applications such as switch and rectifier.   Apply

CO 6 **Extend** the biasing techniques for bipolar and uni-polar transistor amplifier circuits considering stability condition for establishing a proper operating point.   Understand

IV. SYLLABUS:

UNIT-I	ELECTRIC CIRCUIT ELEMENTS	Classes: 10

Electrical circuit elements: Voltage and current sources, linear, non linear, active and passive elements, inductor current and capacitor voltage continuity, Kirchhoff's laws, elements in series and parallel, superposition in linear circuits, controlled sources, energy and power in elements, energy in mutual inductor and constraint on mutual inductance.

UNIT-II	NETWORK ANALYSIS AND THEOREMS	Classes: 07

Network analysis: Nodal analysis with independent and dependant sources, modified nodal analysis, mesh analysis, notion of network graph, nodes, trees, twigs, links, co-tree, independent sets of branch

currents and voltages; Network theorems: Voltage shift theorem, zero current theorem, Tellegen's theorem, reciprocity, substitution theorem, Thevenin's and Norton's theorems, pushing a voltage source through a node, splitting a current source, compensation theorem, maximum power transfer theorem.

UNIT-III	AC CIRCUITS	Classes: 11

RLC circuits: Natural, step and sinusoidal steady state responses, series and parallel RLC circuits.
AC signal measurement: Complex, apparent, active and reactive power, power factor.

Introduction to three phase supply: Three phase circuits, star-delta transformations, balance and unbalanced three phase load, power measurement, two wattmeter method.

UNIT-IV	SEMICONDUCTOR DIODE AND APPLICATIONS	Classes: 09

P-N diode, symbol, V-I characteristics, half wave rectifier, full wave rectifier, bridge rectifier and filters, diode as a switch, Zener diode as a voltage regulator.

UNIT-V	BIPOLAR JUNCTION TRANSISTOR AND APPLICATIONS	Classes: 08

DC characteristics, CE, CB, CC configurations, biasing, load line, Transistor as an amplifier.

Text Books:

1. A. Chakrabarti, "Circuit Theory", Dhanpat Rai Publications, 6th Edition, 2004.
2. K. S. Suresh Kumar, "Electric Circuit Analysis", Pearson Education, 1st Edition, 2013.
3. William Hayt, Jack E. Kemmerly S. M. Durbin, "Engineering Circuit Analysis", Tata McGraw-Hill, 7th Edition, 2010.
4. J. P. J. Millman, C. C. Halkias, Satyabrata Jit, "Millman's Electronic Devices and Circuits", Tata McGraw Hill, 2nd Edition, 1998.
5. R. L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuits", PEI/PHI, 9th Edition, 2006.

Reference Books:

1. Charles A. Desoer, Ernest S.Kuh, "Basic Circuit Theory", Tata McGraw Hill, 1st Edition, 1969.
2. S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, "Electronic Devices and Circuits", Tata McGraw-Hill, 2nd Edition, 2011.
3. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, 2005.
4. M. Arshad, "Network Analysis and Circuits", Infinity Science Press, 9th Edition, 2016.
5. A. Bruce Carlson, "Circuits", Cengage Learning, 1st Edition, 2008.

Web References:

1. http:// www.nptel.ac.in/Courses/117106108
2. http:// www.powerlab.ee.ncku.edu.tw
3. http:// www.textofvideo.nptel.iitm.ac.in

E-Text Books:

1. http://www.textbooksonline.tn.nic.in
2. http://www.bookboon.com
3. http://www.ktustudents.in

Course Home Page: