

GEE11001	Electrical and Electronics Technology	L	T	P	C
Version 1.0	Contact Hours - 45	3	0	0	3
Pre-requisites/Exposure	Basic idea about basic mathematics				
Co-requisites	Basic idea of semiconductor devices and electromagnetism				

Course Objectives:

- To familiarize with passive components, active components and measuring instruments.
- To familiarize the working of diodes, transistors, MOSFETS and integrated circuits.
- To implement mini projects based on concept of electronics circuit concepts.
- To understand d-c network theorems and apply these theorems to calculate the voltage, current and power for a given circuit.
- To explain the concept of active power, reactive power, power factor, quality factor, steady state sinusoids.

Course Outcomes:

At the end of the course, the student will be able to:

CO1. Apply knowledge about different passive components used in electronic industry for common application. **CO2.** Illustrate with the working of different active components to demonstrate basic electronic circuits.

CO3. Design circuits using passive and active components for strengthening fundamental idea about basic electronics.

CO4. Describe the basic construction of measuring instruments used in electronic measurements.

CO5. Apply the Network theorems to calculate the voltage, current and power for a given circuit.

CO6. Explain Active Power, Reactive Power, Power factor, Quality factor, average and effective values of Sinusoids, complex representation of impedances and draw the Phasor diagram.

CO7. Understand the three-phase power measurement.

CO8. Explain PN Junction Diode in Forward Biased, Reverse Biased Condition, Breakdown in PN Junction Diodes and Different Configurations of a Transistor and its Characteristics.

CO9. Demonstrate digital logic circuit and switching circuits using MOSFET.

Course Description:

Present technology requires necessary knowledge of ELECTRONICS in most fields. Avionics, Autotropic, Agrotronics, Physics, Process Chemistry, Health Services, etc., already employ components or even whole systems based on Electronics. Thus, there is an increasing number of professionals in these and many other fields who need adequate knowledge and training. Taken this into account, ADAMAS has developed the Basic Electronics and Electricity Integrated Laboratory, capable of covering different levels of difficulty. It is based on a series of self-taught modules, each one referring to a specific area of Electronics

Course Content:

Units	Lecture Hours
Module-1: D.C. Circuit Analysis and Network Theorems: Concept of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements, source transformation, Kirchoff's Law, mesh analysis and nodal analysis, star-delta transformation, network theorems: Thevenin's theorem, Norton's theorem, maximum power transfer theorem, network analysis with dependent sources.	7
Module-2: Steady State Analysis of Single Phase A.C. Circuits: Sinusoidal, square and triangular waveforms- average and effective value, form the peak factors, concept of phasor, phasor representation of sinusoidal voltage and current, analysis of series-parallel RLC circuits. Apparent, active and reactive powers, power factor, causes and problems of low power factor, power factor improvement, resonance in series and parallel circuits, bandwidth and quality factors.	6
Module-3: Three Phase A.C. Circuits: Its necessity and advantages, meaning of phases sequence, star and delta connections, balanced supply and balanced load, line and phase voltage/current relation, three phase power measurements, two wattmeter method.	6
Module-4: Basics of Semi-Conductors and PN Junction: Introduction; Carrier Concentrations- the Fermi Level; Electron and Hole Concentrational Equilibrium; Temperature Dependence of Carrier Concentration; Drift and diffusion current; The Hall Effect; Optical Absorption, Luminescence; PN Junction Diode in Equilibrium Conditions; PN Junction Diode in Forward Biased and Reverse Biased Condition; Breakdown in PN Junction Diodes.	7
Module-5: Bipolar Junction Transistors: Introduction, Types: NPN and PNP; Current Components; Early Effect Ebers-Moll Model; Different Configurations of a Transistor and its Characteristics; Transistor as an Amplifier (CE, CB, CC); Transistor as a Switch.	6
Module-6: Field Effect Transistors: Introduction, JFET and MOSFET, Realization of digital logic circuit using MOSFET (AND, OR, NOT etc.), Realization of switching circuit using MOSFET.	6
Module-7: Electronics Instruments & Digital Electronics Fundamental: Signal generator, Multimeter, operation of CRO and its application. Number systems, Conversions and codes, Logic gates and truth tables.	7

Text Books:

- Electronic Devices & Circuit Theory: Boylestad & Nashelsky

Course Code	Course Name	COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
		CO1100	2	1	3	3	2	2	1	-	2	-	-	2	1	2	2
		1.8															
		CO1100	3	1	1	2	2	3	2	-	2	-	-	3	3	1	1
		1.9															
		CO1100	2.	1.	2.	2.	2.	2.	2.	2.	2.	2.0	3.0	2.3	1.8	1.7	1.6
		1	44	78	44	22	44	44	11	0	33			3	9	8	7