

LINEAR ELECTRONICS

SUBJECT CODE: IT 302

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
03	00	02	05	04	03	70	30	20	30	150

Learning Objectives

The educational objectives of this course are

- To focus on digital signals.
- To introduce binary numbers, decimal, octal, hexadecimal numbers and their conversions.
- To Focus on Analog and Digital signals.
- Brief the students regarding Logic gates, adders, subtractors, multiplexers, decoders, etc.
- To give clear idea of flipflops, registers and counters.

Outline of the Course

Sr. No	Title of the Unit	Minimum Hours
1	Basics of Semiconductor	5
2	Diode Characteristics	8
3	Transistor biasing and characteristics	8
4	Field effect transistor	9
5	OPAMS and oscillators	6
6	Power Supplies	3
7	Measuring Instruments and Transducers	6

Total hours (Theory): 45

Total hours (Lab): 30

Total hours: 75

Detailed Syllabus

Unit No	Topics	Lectures (Hours)	Weight age (%)
1.	<u>Basics of semiconductor :</u> The Energy Band Theory of Crystals, Insulators, Semiconductors and Metals, Mobility and Conductivity, Electrons and Holes In An Intrinsic Semiconductor, Donor and Acceptor Impurities, Charge Densities Mobility and Conductivity ,Electrons and Holes in an Extrinsic Semiconductor, Diffusion, Hall Effect.	5	14
2.	<u>Diode Characteristics :</u> Open-Circuited PN Junction, P-N Junction as A Rectifier, Current Components in A PN Junction Diode , Volt-Ampere Characteristics of Diode, Photo-Diode, Transition Capacitance (CT), Diffusion Capacitance, Diode Resistance, Rectifiers: Half & Full Wave Circuits, C, LC, Filters using Diode, Clipping & clamping circuits, LED, Zener diode.	8	18
3.	<u>Transistor biasing & Characteristics :</u> Basics of Transistor, Transistor operations and Characteristics , transistor as a amplifier & Switch, Transistor configurations- CB, CC, CE, CE cutoff, and Saturation regions, Phototransistor.	8	18
4.	<u>Field effect transistor:</u> Construction, operation & characteristics of JFETs, parameters of JFETS, operation & characteristics of Depletion type MOSFET and Enhancement-type MOSFET, Basics of CMOS.	9	18
5.	<u>OPAMS & Oscillators:</u> Idea op-amplifier characteristics, Block diagram, Basic Inverting & non inverting amplifier, Basics of oscillator, Hartley oscillator, colpitt's oscillator, and phase shift oscillator, wien bridge oscillator. Basics of Timer IC 555 & block diagram.	6	12
6.	<u>Power supplies:</u> Basics & types of voltage regulator, ICs (7805, 7812, 7905, 7912), SMPS, Types of switching regulator.	3	8
7.	<u>Measuring Instruments & Transducers:</u> CRT, Block diagram of CRO, Block diagram of Digital multi meter, Block diagram of DSO. Block diagram of an Instrumentation system, Basics of Transducers, LVDT, Temperature transducers, Capacitive transducer, and Inductive transducer.	6	12
	Total	45	100

Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a 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 concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

LEARNING OUTCOME:

- On successful completion of the course, the student will be having the basic knowledge of digital signals conversions of numbers of different base.
- Student will have the basic knowledge of signals, power supplies, transducers and amplifiers

Text Books:

1. The Art Of Electronics by Horowitz & Hill

Reference Books:

1. Practical Electronics for Inventors, By Paul Scherz and Simon Monk

Web Material:

1. http://www.zeepedia.com/read.php?octal_numbers_octal_to_binary_decimal_to_octal_conversion_digital_logic_design&b=9&c=4

List of Practicals

Sr No.	List of Practicals
1	Implementation and Measurement of Basic Electronic Circuits <ul style="list-style-type: none">• Op-Amp Circuits<ul style="list-style-type: none">○ Inverting and Non Inverting Amplifiers○ Summing Amplifier○ Saw-tooth waveform generator
2	Thyristor Circuits <ul style="list-style-type: none">• SCR triggering technique• UJT as relaxation Oscillator• TRIAC firing using DIAC
3	Digital Circuits <ul style="list-style-type: none">• Basic Gates• Half and Full Adder Circuits
4	Seminar based on Micro-controller Applications in a group of 3 students
5	Simulation exercises on basic electronic circuits