

22BEAS115 APPLIED ELECTRONICS AND INSTRUMENTATION

Hours Per Week :

L	T	P	C
2	0	2	3

PREREQUISITE KNOWLEDGE: Basics of electronics.

COURSE DESCRIPTION AND OBJECTIVES:

The goal of this course is to provide an overview of the principles, operation and application of the building blocks like diodes, BJT, OP-amps, Feedback amplifiers, oscillators etc for performing various functions. To understand the internal structure of all instruments that are used in measuring parameters related to electronics and to understand how different bridge networks are constructed and balanced for find out values of capacitance, resistance and inductance. To understand about different transducers, that are used for measurement purpose and their working principles.

MODULE-1

UNIT-1

8L+0T+8P=16 Hours

SEMICONDUCTORS:

Semiconductors. p—n junction. V—I characteristics of p—n junction. diode as a circuit element. rectifier. clipper. damper, voltage multiplier, capacitive filter. diode circuits for OR & AND (both positive and negative logic), bipolar junction transistor: operating point. classification (A.B & C) of amplifier.

UNIT-2

8L+0T+8P=16Hours

BIASING METHODS:

Various biasing methods (fixed. Self-potential divider). h-parameter model of a transistor. analysis of small signal. CE amplifier. phase shift oscillator, analysis of differential amplifier using transistor. ideal OP-AMP characteristics. linear and non-linear applications of OP-AMP (adder. subtractor. integrator, active rectifier. comparator. differentiator. differential, instrumentation amplifier and oscillator).

PRACTICES:

- To study V-I characteristics of p-n junction diode.
- To study half wave. full wave and bridge rectifier.
- To study transistor characteristics in CE configurations.
- To design and study fixed and self bias transistor.
- To design and study potential divider bias transistor.

MODULE-2

UNIT-1

8L+0T+8P=16 Hours

LOGIC CIRCUITS:

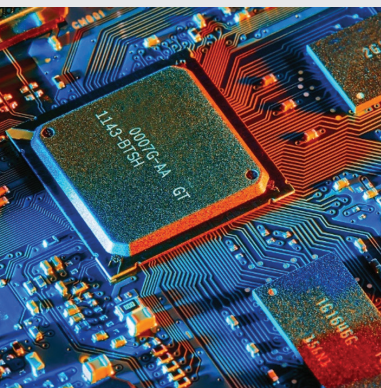
Zener diode voltage regulator. transistor series regulator. current limiting. OP-AMP voltage regulators. Basic theorem of Boolean algebra. Combinational logic circuits (basic gates. SOP rule and Kmap).

UNIT-2

8L+0T+8P=16 Hours

BINARY LADDER:

Binary ladder D/A converter, successive approximation A/D converter, generalized instrumentation, measurement of displacement. temperature. velocity, force and pressure using potentiometer. resistance thermometer. thermocouples. Bourclen tube. LVDT. strain gauge and tacho-generator.



Source: <https://www.goodfon.ru/wallpaper/electronics-electrical.html>

PRACTICES:

- To study a diode as clipper and clamper.
- To study a OP-AMP IC 741 as inverting and non- inverting amplifier.
- To study a OP-AMP IC 741 as differentiator and integrator to study a differential amplifier using two transistors.
- To study a OP-AMP IC 741 as differential amplifier.
- To study a zener regulator circuit.
- To study a OP-AMP IC 741 as a active rectifier.
- To study a OP-AMP IC 741 as a comparator.
- To familiarize with various types of transducers.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply the notation and usage of components in electric circuits.	Apply	1	1, 2, 4, 6, 7, 9
2	Apply various electrical machines used in agriculture and troubleshoot the problems associated with it.	Apply	2	1, 2, 6, 7, 9
3	Application of various electronic devices to perform small task.	Apply	2	1, 2, 3, 4, 6, 7, 9, 11
4	Analyze AC (single and three phase) and DC and AC circuits using different methods and laws.	Analyze	1	1, 2, 3, 4, 6, 9

TEXT BOOKS:

1. Mehta V K. "Principles of Electronics", S. Chand and Co., New Delhi, 2014.
2. Shaney A K. "Measurement of Electronics and Electronic Instrumentation, 2019 Khanna Publications, 2017.

REFERENCE BOOKS:

1. Roy Chowdary, "Integrated Electronics", John Wiley International.
2. Kumar Anand, "Digital Electronics" A. PHI, 2009.
3. Gupta Sanjeev, Sonthosh Gupta "Electronic Devices and Circuits", Danapath Rai Publications, 2012.

SKILLS:

- ✓ Distinguish between linear and nonlinear elements by looking at VI characteristics.
- ✓ Develop a simple loop generator.