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22EC104 SEMICONDUCTOR PHYSICS AND DEVICES

Hours Per Week :

L	Т	Р	С
2	0	2	3

PREREQUISITE KNOWLEDGE: Basics of Physics

COURSE DESCRIPTION AND OBJECTIVES:

This course is aimed at offering fundamental concepts of semiconductor devices and circuits. It starts with the concepts of the Junction Diode, Transistor, MOSFET and other basic devices that are designed with semiconductor materials. As a first-level course in electronics, the objective of this course is to form the basis for the understanding of advanced electronic courses that are offered in subsequent semesters.

UNIT-1

8L+0T+8P=16 Hours

8L+0T+8P=16 Hours

SEMICONDUCTOR PHYSICS:

Classifications of semiconductors, drift and diffusion currents, Fermi-level, Energy band diagram, P-N Junction diode, V-I Characteristics, Temperature dependence of V-I characteristics, diode current equation.

UNIT-2

SEMICONDUCTOR DEVICES:

Zener diode, Varactor diode, PNPN diode, SCR, Construction, working and characteristics of BJT and MOSFET

PRACTICES:

- P-N Junction diode characteristics.
- Zener diode characteristics and Zener diode as Voltage regulator.
- Verification of UJT Characteristics
- Transistor CB characteristics (Input and Output).
- Transistor CE characteristics (Input and Output).
- Transistor CC characteristics (Input and Output).
- MOSFET characteristics.

MODULE-2

UNIT-1

DIODE APPLICATIONS:

Rectifier, clippers, clampers, Zener diode as voltage regulator.

UNIT-2

BJT BIASING AND APPLICATIONS:

Transistor biasing and stabilization, small signal analysis, Determination of h-parameters form CE characteristics, BJT as a switch, BJT as amplifier, frequency response of CE amplifier.

PRACTICE:

- Determination of the ripple factor and efficiency of Half wave Rectifier with and without filter.
- Determination of the ripple factor and efficiency of Centre tapped Full wave Rectifier with and without filter.
- Determination of the ripple factor and efficiency of Bridge Rectifier with and without filter.



elprocus.com /wp-content/ uploads/ 2016/06/2016-06-10_11-36-59.jpg

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ECE - I Year II Semester

SKILLS:

- ✓ Identify a Semiconductor Diode for a specific application.
- ✓ Implement a RPS for a specific Application.
- ✓ Construct a stable biasing circuit for an amplifier.
- ✓ Design an electronic switch.
- ✓ Design an amplifier for a specific application.

COURSEOUTCOMES:

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

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Make use of the basic material concepts to construct the semiconductor devices.	Apply	1,2	1,2,12
2	Apply the usage of semiconductor device concepts in circuit making.	Apply	2	1,2,12
3	Develop electronic circuits using various components.	Apply	1,2	1,2,5,12
4	Analyse the various types of amplifiers.	Analyse	2	1,2,3,5,12

TEXT BOOKS:

- 1. J. Millman and C.C. Halkias, "Electronic Devices and Circuits", 4th edition, Tata Mc-Graw Hill, 2015.
- 2. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits", Pearson/Prentice Hall, 4th edition, 2015.

REFERENCE BOOKS:

- 1. J. Millman and Christos C. Halkias, "Integrated Electronics", 2nd Edition, Tata Mc-Graw Hill, 2017.
- 2. K. Thomson, "Electronic Switching Circuits", 2nd edition, Oxford University Press, 2012.
- 3. Salivahanan and N Suresh Kumar," Electronic Devices and Circuits", 4th edition, Tata McGraw Hill, 2016.