

B.E. Semester: 3
Electronics & Communication Engineering
Subject Name: Basic Electronics
Sub Code: EC-303

A. Course Objective :

The educational objectives of this course are

- To understand the basics semiconductor materials.
- To study about the semiconductor devices as a Diode, Transistor, FET & MOSFETs.
- To study the **Characteristics** of Diode, Transistor, FET & MOSFETs.

B. Teaching / Examination Scheme :

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
CODE	NAME	L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
		Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
EC 303	Basic Electronics	4	0	2	6	5	3	70	30	20	30	150

C. Detailed Syllabus :

1. Basics of Semiconductor :

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 Intrinsic Semiconductor, Hall Effect, Conductivity Modulation.

2. Diode Characteristics:

Open-Circuited PN Junction, P-N Junction as A Rectifier, Current Components in A PN Junction Diode, Volt-Ampere Characteristics, Photo-Diode, Temperature Dependence of Diode Characteristic, Transition Capacitance (CT), Diffusion Capacitance, Diode Resistance, Charge Control Description of A Diode, Rectifiers, Full Wave Circuits, C, LC, II Filters, Clipping & clamping circuits, LED, Zener diode, current regulatory diode (CRD).

3. Transistor Biasing & Characteristics : Transistor Characteristics And Transistors Biasing ,And Thermal Stabilization: Junction Transistor, Transistor action, transistor currents ,component, transistor as a amplifier, transistor configurations- CB, CC, CE, CE cutoff, and saturation regions, Maximum voltage rating, DC operating point, Bias stabilization, Stabilization techniques, Bias compensation, Thermal runaway, Phototransistor, Transistor as a switch

4. Field Effect Transistors : Construction & characteristics of JFETs, Transfer characteristics, Depletion type MOSFET, Enhancement-type MOSFET, MOSFET Handling, CMOS, JFET biasing circuits, Depletion-type MOSFET biasing circuits, Enhancement-type MOSFET biasing circuits, FET Small signal model, AC analysis of different types of biased FET amplifiers, Signal to noise ratio in amplifier design.

5. Transistor at low frequency: Transistor As An Amplifier, General Characteristics Of An Amplifier, Hybrid Model, Determination Of H-Parameters From Characteristics. Analysis Of Amplifier Circuit Using H-Parameters. Common Emitter Circuit, Common Collector Or Emitter Follower Circuit, Common Base Circuit, Analysis Of Common Emitter Amplifier With Collector To Base Bias, Comparison Of Transistor Amplifier Configurations, Linear Analysis Of A

Transistor, Miller's Theorem And It's Dual, Cascading Transistor Amplifiers, Simplified CE And CC Hybrid Model.

- 6. Multistage Amplifiers:** Classification of amplifiers, Distortion in amplifiers, Frequency, response of an amplifier, step response of an amplifier, Band pass of cascaded stages. Two stage RC amplifier.

D. Lesson Planning :

Sr. No.	Lectures (Hours)	Weightage in % in Exam	Topics
1.	7	13	Basics of Semiconductor : 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 Intrinsic Semiconductor, Hall Effect, Conductivity Modulation.
2.	11	17	Diode Characteristics: Open-Circuited PN Junction, P-N Junction as A Rectifier, Current Components in A PN Junction Diode, Volt-Ampere Characteristics, Photo-Diode, Temperature Dependence of Diode Characteristic, Transition Capacitance (CT), Diffusion Capacitance, Diode Resistance, Charge Control Description of A Diode, Rectifiers, Full Wave Circuits, C, LC, II Filters, Sampling gate, Clipping& clamping circuits, LED, Zener diode, current regulatory diode.
3.	14	20	Transistor biasing & Characteristics : Transistor Characteristics And Transistors Biasing ,And Thermal Stabilization: Junction Transistor, Transistor action, transistor currents ,component, transistor as a amplifier, transistor configurations- CB, CC, CE, CE cutoff, and saturation regions, Maximum voltage rating, DC operating point, Bias stabilization, Stabilization techniques, Bias compensation, Thermal runaway, Phototransistor, Transistor as a switch
4.	10	20	Field Effect Transistors : Construction & characteristics of JFETs, Transfer characteristics, Depletion type MOSFET, Enhancement-type MOSFET,MOSFET Handling, VMOS,CMOS,JFET biasing circuits, Depletion-type MOSFET biasing circuits, Enhancement-type MOSFET biasing circuits, FET Small signal model, AC analysis of different types of biased FET amplifiers, Signal to noise ratio in amplifier design.
5.	9	15	Transistor at Low frequency: Transistor As An Amplifier, General Characteristics Of An Amplifier, Hybrid Model, Determination Of H-Parameters From Characteristics. Analysis Of Amplifier Circuit Using H-Parameters. Common Emitter Circuit, Common Collector Or Emitter Follower Circuit, Common Base Circuit, Analysis Of Common Emitter Amplifier With Collector To Base Bias, Comparison Of Transistor Amplifier Configurations, Linear Analysis Of A Transistor, Miller's Theorem And It's Dual, Cascading Transistor Amplifiers, Simplified CE And CC Hybrid Model.
6.	9	15	Multistage Amplifiers: Classification of amplifiers, Distortion in amplifiers, Frequency, response of an amplifier, step response of an amplifier, Band pass of cascaded stages. Two stage RC amplifier.
Total	60	100	

E. Instructional Method And Pedagogy (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures, practicals and Tutorial which carries 05 Marks.
- At regular intervals assignments is given. In all, a student should submit all assignments of 05 marks each.
- Classroom participation and involvement in solving the problems in Tutorial rooms carries 05 Marks.
- Viva Voce will be conducted at the end of the semester of 05 Marks.
- One internal exam of 30 marks is conducted as a part of mid semester evaluation.
- Experiments shall be performed in the laboratory related to course contents.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.

F. Suggested List Of Experiments:

1. To perform an experiment to find V-I Characteristics of P-N Junction Diode.
2. To perform an experiment to find V-I Characteristics of Light Emitting Diode.
3. To perform the half wave rectifier and Draw the input and output waveforms.
4. To perform the center tap full wave rectifier and Draw the input and output waveforms.
5. To perform Bridge full wave rectifier and Draw the input and output waveforms.
6. To perform and Plot the Characteristics of Common base (C.B) Transistor.
7. To perform and Plot the Characteristics of Common emitter (C.E) Transistor
8. To perform Clamping Circuits.
9. To perform Clipping Circuits.
10. To perform Series Voltage Regulator using Zener Diode.
11. To perform two stages RC coupled amplifier.
12. Mini Project

G. Students Learning Outcomes:

On successful completion of the course

The student can learn about detailed aspects Electronics of all the areas in day to day life.

Can also learn about and different Electronics components like Diode, Transistor, FETs & MOSFETs.

H. Recommended Study Materials:

TEXT BOOK:

1. Integrated Electronics by Jacob Millman Halkias Tata McGraw-Hill Edition 1991.

REFERENCE BOOKS:

1. Electronics Devices and Circuit Theory (sixth Edition) by Boylestead & Louis Nashelsky published By Pearson Education Asia.
2. Electronics Device & circuit-1 by s.c sarkar by everest publishing.
3. Electronics Device & circuits by sanjeev gupta by dhanpat rai publishing.
4. Electronics Devices and circuits by David A.Ball by Oxford publishing.

