ELECTRONIC DEVICES AND CIRCUITS

III Semester: ECE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AECB06	CORE	3	1	0	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The will try to learn:

I. The operational principles, characteristics of semiconductor devices and circuits for rectification, amplification, conditioning and voltage regularization of signals.
II. The analytical skills needed to model analog and digital integrated circuits (IC) at discrete and micro circuit level
III. The foundations of basic electronic circuits necessary for building complex electronic hardware.
IV. Familiarize the students with circuit simulation techniques

COURSE OUTCOMES:

1 **Summarize** the semiconductor device properties using energy band diagrams.

2 **Illustrate** the volt-ampere characteristics of pn junction diode for finding cut-in voltage, static and dynamic resistances.

3 **Apply** the pn junction characteristics for the diode applications such as switch, clippers, clampers and rectifiers.

4 **Demonstrate** the constructional features and principle of operation of bipolar and uni-polar devices for distinguishing between cut off, active and saturation regions of operation.

5 **Establish** the relations of current gain, voltage gain of bipolar junction transistor and field effect transistor respectively using their characteristics

6 **Analyse** the input and output characteristics of transistor configurations for determining the input - output resistances, current gain and voltage gain.

7 **Estimate** the characteristic parameters of BJT, FET amplifier circuits using low frequency model.

8 **Examine** DC and AC load line analysis of BJT and FET amplifiers for optimal operating level regardless of input, load placed on the device.

9 **Design** the various biasing techniques for BJT, JFET and MOSFETs amplifier circuits considering stability condition for establishing a proper operating point.

10 **Compute** the characteristic parameters of FET and MOSFETs in common source, common drain and common gate amplifiers using the drain and the transfer characteristics.

11 **Demonstrate** the working principle of special purpose semiconductor diodes and transistors for triggering and voltage regulation applications.

12 **Design** basic electronic circuits using active transistors

13 **Apply** electronic circuits in global engineering applications

MODULE -I	DIODE AND APPLICATIONS	Classes: 08
Diode - Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Diode Applications: Switch-Switching times. Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers With Capacitive Filter, Clippers-Clipping at two independent levels, Clampers-Clamping Operation, types, Clamping Circuit Theorem, Comparators.		
MODULE - II	**BIPOLAR JUNCTION TRANSISTOR (BJT)**	**Classes: 10**
Principle of Operation and characteristics - Common Emitter, Common Base, Common Collector Configurations, Operating point, DC & AC load lines, Transistor Hybrid parameter model, Determination of h-parameters from transistor characteristics, Conversion of h-parameters.		
MODULE-III	**TRANSISTOR BIASING AND STABILIZATION**	**Classes: 10**
Bias Stability, Fixed Bias, and Collector to Base bias, Self-Bias, Bias Compensation using Diodes and Transistors. Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.		
MODULE-IV	**JUNCTION FIELD EFFECT TRANSISTOR**	**Classes: 08**
Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Comparison of BJT and FET, Biasing of FET, FET as Voltage Variable Resistor, MOSFET Construction and its Characteristics in Enhancement and Depletion modes.		
MODULE-V	**FET AMPLIFIERS**	**Classes: 09**
Small Signal Model, Analysis of CS, CD, CG JFET Amplifiers. Basic Concepts of MOSFET Amplifiers. Special Purpose Devices: Zener Diode - Characteristics, Voltage Regulator; Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode.		

Text Books:

1. Electronic Devices and Circuits - Jacob Millman, McGraw Hill Education.
2. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, Pearson, 2009.

Reference Books:

1. The Art of Electrionics , Horowitz, 3rdEdition Cambridge University Press, 2018
2. Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford.
3. Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. Prakash Rao, 2 Ed., McGraw Hill, 2008.
4. Electronic Devices and Circuits, S. Salivahanan, N.Suresh Kumar, A Vallvaraj, 2nd Edition, TMH.

Web References:

1. http://www-mdp.eng.cam.ac.uk/web/library/enginfo/electrical/hong1.pdf
2. https://archive.org/details/ElectronicDevicesCircuits
3. http://nptel.ac.in/courses/Webcourse-contents/IIT-ROORKEE/BASIC ELECTRONICS/home_page.htm
4. http://www.vidyarthiplus.in/2011/11/electronic-device-and-circuits-edc.html
5. http://www.satishkashyap.com/2013/03/video-lectures-on-electron-devices-by.html

E-Text Books:
1. http://services.eng.uts.edu.au/pmcl/ec/Downloads/LectureNotes.pdf 2. http://nptel.ac.in/courses/122106025/ 3. http://www.freebookcentre.net/electronics-ebooks-download/Electronic-Devices-and-Circuits-(PDF-313p).html 4. https://www.jntubook.com/electronic-device-circuits-textbook-free-download/ 5. http://www.faadooengineers.com/threads/32735-Electronic-Devices-And-Circuits-(EDC)-by-J-B-Gupta-full-book-pdf