



Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
Second Year Bachelor of EC Engineering

Subject Code: EC304-N	Subject Title: ELECTRONICS DEVICES AND CIRCUITS
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Course Objective:

- 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.

Teaching Scheme (Credits and Hours)

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

Outline of the Course:

Sr. No.	Title of the Unit	Hours
1	Basics of Semiconductor	10
2	Diode Characteristics	10
3	Transistor Biasing & Characteristics	10
4	Field Effect Transistors	10
5	Integrated circuit fabrication process	8

Total hours (Theory): 48

Total hours (Tutorial): 32

Total hours: 80



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Detailed Syllabus:

Unit No.	Topic	Lecture Hours	Weightage(%)
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.	10	15
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, Clipping& clamping circuits, LED, Zener diode, LED, Photo Diode, solar cell.	10	25
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.	10	25
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, small signal models of MOS transistor.	10	20
5.	Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography, etching, chemical vapor deposition, sputtering, twin-tub CMOS process.	8	15
	Total	48	100



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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. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

Learning Outcomes:

At the end of this course, the student would be able

- To differentiate the ideas and utilizations of semiconductor materials.
- Learn significance of Diodes working process.
- Apply the concepts of BJT and FET applications.

TEXT BOOKS & REFERENCE BOOKS :

1. G. Streetman, and S. K. Banerjee, "Solid State Electronic Devices, "7th edition, Pearson,2014.
2. D. Neamen , D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education
3. S. M. Sze and K. N. Kwok, "Physics of Semiconductor Devices," 3rd edition, John Wiley & Sons, 2006.
4. C.T. Sah, " Fundamentals of solid state electronics," World Scientific Publishing Co. Inc, 1991.
5. Y. Tsividis and M. Colin, " Operation and Modeling of the MOS Transistor," Oxford Univ.Press, 2011.
6. Electronics Device & circuits by sanjeev gupta by dhanpat rai publishing.



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7 Electronic devices and circuits By Salivahanan, McGraw-Hill Educatio

LIST OF EXPERIMENTS

Sr. No.	Experiment Title
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.	Mini Project