Dept.: ECE -A

Academic Year: 2025 – 2026					
Name/Dept	:	Dr.S.Sridhar, Professor, ECE	Year/Semester	:	II / I
Course Title	:	Electronic Devices & Circuits	Hours Required	:	80
Course Code	:	23EC304	Hours Planned	:	80
Pos	:	PO1, PO2, PO3, PO5, PO12	Pre-Requisite	Applied Physics & BEEE	

Course Outcomes:

1. Understand the principle of operation, characteristics and applications of semiconductor diodes, bipolar junction Transistor and MOSFETs (L2)
2. Apply the basic working principles to solve problems related to semiconductor diodes, BJTs, and MOSFETs (L3)
3. Analyse diode circuits for different applications such as rectifiers, clippers, and clampers (L4)
4. Analyse transistor biasing circuits of BJTs and MOSFETs (L4)
5. Design diode circuits and amplifiers using BJTs and MOSFETs (L4)

Unit -1 **PN junction diode Characteristics**	**TextBooks:** 1. Integrated electronics - J. Milliman and C Halkias, Tata McGraw Hill Edn Pvt.Ltd, 2nd Edition, 2011 2. Electronic Devices and Circuits - J. Milliman and C Halkias, McGraw Hill Edn Pvt.Ltd, 4th Edition, 2015 **Reference Books:** 3. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, Tata McGraw Hill Edn Pvt.Ltd, 3rd Edition, 2012
Target Lecture Hours:16	
Target Tutorial Hours: 02	

S. No.	Date	Period Reqd.	Topics to be Covered	Cos	Actual Date of Completion	Mode of Teaching	Remark
1	23/6	1	Introduction to CO-PO mapping for course			PPT	
2	24/6	1	Quantitative Theory of PN Diode,	1		PPT, Chalk and Talk,	
3	26/6	1	Open circuit PN junction diode, Biased PN Junction diode	1		PPT, Chalk and Talk	
4	27/6	1	PN diode as a rectifier, V-I characteristics and its temperature dependence	1		PPT, Chalk and Talk	
5	28/6	1	current components in a p-n Diode, Diode current equation			Think Pair -Share	
6	30/6, 01/7	2	Diode resistance, Transition and Diffusion Capacitance,	1		PPT, Chalk and Talk	
7	02/7	1	Problems				
8	03/7	1	Tutorial-I				
9	04/7, 05/7	2	Types of rectifiers - Half Wave Rectifier - with & without Filters	1		PPT, Chalk and Talk	
10	07/7	1	Full Wave Rectifier - with & without Filter	1		PPT, Chalk and Talk	
11	08/7	1	Breakdown mechanism, Solar cell	1		PPT, Chalk and Talk	
12	10/7	1	Ripple Factor and Regulation Characteristics,	1		PPT, Chalk and Talk	
13	11/7	1	Introduction to Zener diode and VI characteristics& voltage regulator	1		Classroom Discussion	
14	12/7, 15/7	2	LED, LCD, Photo diode	1		PPT, Chalk and Talk	
15	17/7	1	Tutorial-II	1		PPT, Chalk and Talk	

Unit II: Bipolar Junction Transistors (BJT) Characteristics	**TextBooks:** 1. Integrated electronics - J. Milliman and C Halkias, Tata McGraw Hill Edn Pvt.Ltd, 2nd Edition, 2011 2. Electronic Devices and Circuits - J. Milliman and C Halkias, McGraw Hill Edn Pvt.Ltd, 4th Edition, 2015 **Reference Books:** 3. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, Tata McGraw Hill Edn Pvt.Ltd, 3rd Edition, 2012
Target Lecture Hours: 18	
Target Tutorial Hours: 02	

S. No.	Date	Period Reqd.	Topics to be Covered	Cos	Actual Date of Completion	Mode of Teaching	Remarks
1	18/7	1	Introduction to Transistor & Transistor construction & working	2		PPT, Chalk and Talk	
2	19/7,21/7	2	transistor current components, transistor current equation,	2		PPT, Chalk and Talk	
3	**22/7, 24/7**	2	transistor configurations, characteristics of CB, CE and CC configurations and their comparison,	2		PPT, Chalk and Talk	
4	25/7, 26/7	2	the early effect, punch through/reach through, transistor as an amplifier	2		PPT, Chalk and Talk	
5	28/7	1	Tutorial-I problems	2		PPT, Chalk and Talk	
6	29/7, 31/7	2	Ebers-Moll model of a transistor, large signal			Flipped Classroom	
7	01/8, 02/8	2	dc and small signal CE values of current gain	2		PPT, Chalk and Talk	
8	04/8, 05/8	2	analytical expressions for transistor characteristics,	2		PPT, Chalk and Talk	
9	07/8, 08/8	2	typical transistor-junction voltages, transistor as a switch,	2		PPT, Chalk and Talk	
10	09/8,11/8	2	transistor switching times, maximum voltage rating,	2		PPT, Chalk and Talk	
11	12/8	1	phototransistor	2		Classroom Discussion	
12	14/8	1	Tutorial -II problems	2		PPT, Chalk and Talk	

Unit III- Field Effect Transistor (FET) characteristics Target Lecture Hours: 14 Target Tutorial Hours: 02	**TextBooks:** 1. Integrated electronics - J. Milliman and C Halkias, Tata McGraw Hill Edn Pvt.Ltd, 2nd Edition, 2011 2. Electronic Devices and Circuits - J. Milliman and C Halkias, McGraw Hill Edn Pvt.Ltd, 4th Edition, 2015 **Reference Books:** 3. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, Tata McGraw Hill Edn Pvt.Ltd, 3rd Edition, 2012

S. No.	Date	Period Reqd.	Topics to be Covered	COs	Actual Date of Completion	Mode of Teaching	Remarks
1	18/8	1	Introduction to JFET and types	3		PPT, Chalk and Talk	
2	19/8, 21/8	2	Construction and Physical Operation,				
3	22/8	1	Pinch-off voltage, JFET characteristics,	3		PPT, Chalk and Talk	
4	23/8, 25/8	2	JFET parameters, JFET equivalent circuits,	3		Think Pair Share	
5	26/8	1	JFET applications, comparison between BJT and JFET	3		PPT, Chalk and Talk	
6	28/8	1	Tutorial-I problems				
7	29/8, 30/8	2	Metal-oxide-Semiconductor FET (MOSFET)- types	3		PPT, Chalk and Talk	
8	01/9	1	Construction, operation and characteristics, comparison between JFET and MOSFET,	3		Flipped Classroom	
9	02/9, 04/9	2	introduction to MOS, CMOS and Bi-CMOS logics,	3		PPT, Chalk and Talk	
10	05/9, 06/9	2	CMOS and Bi-CMOS inverter circuits and their operation			Classroom Discussion	
11	08/9	1	Tutorial-II problems				

Unit IV: Transistor Biasing and Thermal Stabilization Target Lecture Hours: 10 Target Tutorial Hours: 02	**TextBooks:** 1. Integrated electronics - J. Milliman and C Halkias, Tata McGraw Hill Edn Pvt.Ltd, 2nd Edition, 2011 2. Electronic Devices and Circuits - J. Milliman and C Halkias, McGraw Hill Edn Pvt.Ltd, 4th Edition, 2015 **Reference Books:** 3. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, Tata McGraw Hill Edn Pvt.Ltd, 3rd Edition, 2012

Sl. No.	Mode of Teaching	Period Reqd.	Topics to be Covered	COs	Actual Date of Completion	Mode of Teaching	Remarks

1	09/9	1	Introduction to Need for biasing, Load line analysis	4		PPT, Chalk and Talk	
2	11/9	1	BJT biasing- methods, fixed bias, collector to base bias,	4		PPT, Chalk and Talk	
3	12/9	1	self-bias, bias stability,			Google it Report	
4	13/9	1	stabilization against variations in V_{BE}, I_C, and β,	4		PPT, Chalk and Talk	
5	15/9	1	stability factors, (S, S', S''),	4		PPT, Chalk and Talk	
6	16/9	1	Tutorial-I problems				
7	19/9	1	bias compensation,	4		PPT, Chalk and Talk	
8	20/9	1	thermal , Biasing of FETs, thermal stability			PPT, Chalk and Talk	
9	22/9	1	Introduction to two-port network, transistor hybrid model,			Flipped Classroom	
10	23/9	1	determination of h-parameters, conversion of h-parameters	4		PPT, Chalk and Talk	
11	25/9	1	generalized analysis of transistor amplifier using h-parameters	4		Think Pair Share	
12	26/9	1	Tutorial-II problems	4			

Unit V: Small Signal Transistor Amplifier Circuits Target Lecture Hours: 12 Target Tutorial Hours: 02	**TextBooks:** 1. Integrated electronics - J. Milliman and C Halkias, Tata McGraw Hill Edn Pvt.Ltd, 2nd Edition, 2011 2. Electronic Devices and Circuits - J. Milliman and C Halkias, McGraw Hill Edn Pvt.Ltd, 4th Edition, 2015 **Reference Books:** 3. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, Tata McGraw Hill Edn Pvt.Ltd, 3rd Edition, 2012

Sl. No.	Date	Period Reqd.	Topics to be Covered	COs	Actual Date of Completion	Mode of Teaching	Remarks
01	27/9,04/10	2	Analysis of CB, CE and CC amplifiers using h-parameter model, comparison of BJT transistor amplifiers	5		PPT, Chalk and Talk	
02	06/10,07/10	2	FET small signal model, analysis of CG, CS and CD amplifiers,	5		Chalk and Talk	
03	10/10	1	comparison of FET amplifiers	5		PPT, Chalk and Talk	
04	14/10	1	Transistor at high frequencies, Hybrid- π model,	5		PPT, Chalk and Talk	
05	16/10	1	Hybrid-π conductance's, Hybrid-π capacitances,			Classroom Discussion	
06	17/10	1	Hybrid-π parameters in terms of h-parameters	5		Interaction & Q/A	
07	18/10,21/10	2	CE short circuit current gain	5		PPT, Chalk and Talk	
08	23/10	1	current gain with resistive load	5		Interaction & Q/A	
09	24/10, 25/10	2	high frequency analysis of FET common source and common drain amplifier circuits.	5		Think Pair Share	
10	27/10	1	Tutorial-I problems	5		PPT, Chalk and Talk	

Text Books

1. Integrated electronics - J. Milliman and C Halkias, Tata McGraw Hill Edn Pvt.Ltd, 2nd Edition, 2011
2. Electronic Devices and Circuits - J. Milliman and C Halkias, McGraw Hill Edn Pvt.Ltd, 4th Edition, 2015

Reference Books:

1. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, Tata McGraw Hill Edn Pvt.Ltd, 3rd Edition, 2012
2. Electronic Devices and Circuit Theory – R.L.Boylestad and LouisNashelky, Pearson Publications, 4th Edn

Faculty-Incharge HoD-ECE