Course Code	18ECC102J	Course Name	ELECTRONIC DEVICES	Course Category	C	Professional Core	L	T	P	C
							3	0	2	4

Pre-requisite Courses	18EES101J	Co-requisite Courses	Nil	Progressive Courses	18ECC201J, 18ECC202J, 18ECE203T, 18ECE303T, 18ECE321T, 18ECE322T
Course Offering Department	Electronics and Communication Engineering	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning
CLR-1 :	Provide a basis for understanding semiconductor material, how a pn junction is formed and its principle of operation	1
CLR-2 :	Explain the importance of diode in electronic circuits by presenting appropriate diode applications	2
CLR-3 :	Discuss the basic characteristics of several other types of diodes that are designed for specific applications	3
CLR-4 :	Describe the basic structure, operation and characteristics of BJT, and discuss its use as a switch and an amplifier.	
CLR-5 :	Describe the basic structure, operation and characteristics of MOSFET, and discuss its use as a switch and an amplifier.	
CLR-6 :	Use modern engineering tools such as PSPICE to carry out design experiments and gain experience with instruments and methods used by technicians and electronic engineers	

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Explain the operation, characteristics, parameters and specifications of semiconductor diodes and special diodes	1	60	70
CLO-2 :	Illustrate important applications of semiconductor diodes and special diodes.	2	60	70
CLO-3 :	Review bipolar transistor construction, operation, characteristics and parameters, as well as its application in amplification and switching.	1	60	70
CLO-4 :	Review field-effect transistor construction, operation, characteristics and parameters, as well as its application in amplification and switching.	1	60	70
CLO-5 :	Construct a circuit, then make functional measurements to understand the operating characteristics of the device / circuit.	3	70	75
CLO-6 :	Solve specific design problem, which after completion will be verified using modern engineering tools such as PSPICE.	2	70	75

Program Learning Outcomes (PLO)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO–1: Professional Achievement	PSO – 2: Project Management Techniques	PSO – 3: Analyze & Research
CLO-1 :	H	-	-	-	-	-	-	-	-	-	-	M	-	-	-
CLO-2 :	-	-	-	-	-	-	-	-	-	-	-	M	-	-	-
CLO-3 :	H	-	-	-	-	-	-	-	-	-	-	M	-	-	-
CLO-4 :	H	-	-	-	-	-	-	-	-	-	-	M	-	L	-
CLO-5 :	-	-	-	-	H	-	-	-	-	-	-	-	L	L	-
CLO-6 :	-	-	-	-	H	-	-	L	H	M	-	M	-	-	-

Duration (hour)		Semiconductor Diodes	Diode Circuits	Special Diodes	Bipolar Junction Transistors	MOS Field-Effect Transistors
		15	15	15	15	15
S-1	SLO-1	Basic semiconductor theory: Intrinsic & extrinsic semiconductors	HWR operation, Efficiency and ripple factor	Backward diode	Physical structure	Physical structure
	SLO-2	Current flow in semiconductors	Problem solving	Varactor diode	Device operation of BJT	Device operation of E-MOSFET & D-MOSFET
S-2	SLO-1	PN junction theory: Equilibrium PN junction	Center-Tapped Transformer FWR operation, Efficiency and ripple factor	Step recovery diode	Current-Voltage characteristics of CE BJT configuration	I-V characteristics of E-MOSFET
	SLO-2	Forward biased PN junction	Problem solving	Point-contact diode	Current-Voltage characteristics of CE BJT configuration	Problem solving
S-3	SLO-1	Reverse biased PN junction	Bridge FWR operation, Efficiency and ripple factor	Metal-semiconductor junction: Structure, Energy band diagram	Current-Voltage characteristics of CB BJT configuration	Derive drain current
	SLO-2	Relation between Current and Voltage	Problem solving	Forward & Reverse Characteristics of Schottky Diode	Current-Voltage characteristics of CB BJT configuration	Problem solving
S 4-5	SLO-1 / SLO-2	Lab 1: PN Junction Diode Characteristics	Lab 4: Diode clipping and clamping circuits	Lab 7: Series and Shunt Regulators	Lab 10: BJT and MOSFET Switching Circuits	Lab 13: Repeat Experiments
S-6	SLO-1	Calculate depletion width	Filters: Inductor & Capacitor Filters	Tunnel Diode	Current-Voltage characteristics of CC BJT configuration	Derive transconductance
	SLO-2	Calculate barrier potential	Problem solving	Tunnel Diode	Current-Voltage characteristics of CC BJT configuration	Problem solving
S-7	SLO-1	Derive diode current equation	Filters: LC & CLC Filters	Gunn Diode	BJT as an amplifier	CMOS FET

	SLO-2	Derive diode current equation	Problem solving	Gunn Diode	BJT as a switch	MOSFET as an amplifier
S-8	SLO-1	Effect of Capacitance in PN junction: Transition Capacitance	Diode Clippers	IMPATT Diode	BJT circuit models – h-parameter	MOSFET as a switch
	SLO-2	Diffusion Capacitance	Problem solving	IMPATT Diode	BJT circuit models – hybrid-π parameter	Problem solving
S 9-10	SLO-1	Lab 2: Zener diode characteristics	Lab 5: BJT Characteristics	Lab 8: MOSFET Characteristics	Lab 11: Photoconductive Cell, LED, and Solar Cell Characteristics	Lab-14: Model Examination
	SLO-2					
S-11	SLO-1	Energy band structure of PN Junction Diode	Diode Clampers	PIN Diode	BJT biasing circuits and stability analysis: Base bias and emitter bias	Biasing Circuits for MOSFET: Gate Bias
	SLO-2	Ideal diode and its current-voltage characteristics	Problem solving	PIN Photodiode	Problem solving	Problem Solving
S-12	SLO-1	Terminal characteristics & parameters	Voltage Multipliers	Avalanche photodiode	Voltage-divider bias	Self-bias
	SLO-2	Diode modeling	Zener diode: Characteristics, breakdown mechanisms	Laser diode	Problem solving	Problem Solving
S-13	SLO-1	DC load line and analysis	Zener resistances and temperature effects Zener diode as voltage regulator	Problem solving	Collector-feedback bias	Voltage-divider bias
	SLO-2	Problem solving	Problem solving	Problem solving	Problem solving	Problem Solving
S 14-15	SLO-1	Lab 3: Diode rectifier circuits	Lab 6: BJT Biasing Circuits	Lab 9: MOSFET Biasing Circuits	Lab 12: Simulation experiments using PSPICE	Lab 15: End-Semester Practical Examination
	SLO-2					

Learning Resources	1. David A. Bell, Electronic Devices and Circuits, 5th ed., Oxford University Press, 2015 2. Donald Neamen, Electronic Circuits: Analysis and Design, 3rd ed., McGraw-Hill Education, 2011 3. Adel S. Sedra, Kenneth C. Smith, Microelectronic Circuits: Theory and Applications, OUP, 2014 4. Thomas L. Floyd, Electronic Devices", 9th ed., Pearson Education, 2013	5. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, 11th ed., Pearson Education, 2013 6. Muhammad Rashid, Microelectronic Circuits: Analysis & Design, 2nd ed., Cengage Learning, 2010 7. Muhammed H Rashid, Introduction to Pspice using OrCAD for circuits and electronics, 3rd ed., Pearson, 2004 8. Laboratory Manual, Department of ECE, SRM University

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

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