

Course Code	Course Title	L	T	P	C
BECS201L	Semiconductor Devices and Circuits	3	0	0	3
Pre-requisite	BEEE102L, BEEE102P	Syllabus version			
		1.0			
Course Objectives:					
1. To apply the knowledge of solid state devices principles to analyze electronic circuits. 2. To demonstrate amplifiers under different configurations and analyse their responses. 3. To impart the knowledge of analog circuit design for various applications.					
Course Outcomes:					
1. Comprehend the basics of semiconductor materials. 2. Understand the behavior of semiconductor devices and their applications. 3. Comprehend design aspects of amplifier circuits. 4. Analyze the performance characteristics and applications of Op-Amp. 5. Design engineering applications using analog ICs.					
Module:1	Semiconductor Materials	6 hours			
Introduction to Solids, Crystals and Electronic Materials; Formation of Energy Bands; Energy Band Model; Intrinsic and Extrinsic Semiconductors; Temperature Dependence; Organic Semiconductor; Carrier Concentration, Carrier Generation and Recombination; Metal-Semiconductor Junction; Fermi Level.					
Module:2	Diode Circuits	4 hours			
PN Junction Diode: Characteristics; Diode Circuits: Clipper, Clamper and Rectifiers; Special Purpose Diodes: LEDs.					
Module:3	Transistors	7 hours			
BJT and FET Characteristics; BJT vs FET; Types of BJT and FET; Load line and Operating Point Analysis of BJT and FET.					
Module:4	Amplifiers	7 hours			
Basic BJT and MOSFET Amplifier Configurations; Calculation of Amplifier Parameters; Differential Amplifier; CMRR; Power Amplifiers: Applications.					
Module:5	Feedback Amplifiers	5 hours			
Basic Concepts of Feedback; Negative Feedback: Advantages, Types: Voltage/Current, Series/Shunt; Positive Feedback; Stability; Conditions for Oscillations: RC and LC Oscillators.					
Module:6	Operational Amplifiers	8 hours			
DC Characteristics, AC Characteristics; Linear applications: Adder, Subtractor, Integrator and Differentiator; Non-Linear Applications: Comparator, Multivibrator; Waveform Generator.					
Module:7	Special ICs	6 hours			
IC555 timer: Astable and Monostable Modes of Operation; Regulator ICs: Fixed and Variable Voltage Regulators; ADC and DAC ICs.					
Module:8	Contemporary Issues	2 hours			
Guest lecture from Industry and R & D Organizations					

	Total Lecture hours:		45 hours
Text Book(s)			
1.	Boylestad, Robert L., and Louis Nashelsky. Electronic Devices and Circuit Theory. Prentice Hall, 2012.		
2.	Sedra, Adel S., and Kenneth Carless Smith. Microelectronic Circuits: Theory and Applications. Oxford University Press, 2013.		
3.	Fiore, James M. Operational Amplifiers & Linear Integrated Circuits: Theory and Application. Dissidents, 2018.		
Reference Books			
1.	Neamen, Donald A. Electronic Circuit Analysis and Design. McGraw-Hill, 2001.		
2.	David A. Bell. Electronic Devices and Circuits. Oxford University Press, 2008.		
3.	Albert Malvino and David Bates. Electronic Principles, McGraw Hill Education, 2021.		
4.	Huijsing, Johan. Operational amplifiers. Dordrecht: Springer Netherlands, 2011.		
Mode of Evaluation: CAT, Digital assignments, Quiz, and FAT			
Recommended by Board of Studies		04-04-2023	
Approved by Academic Council		No. 70	Date 24-06-2023