

**Code: 1BECE105/205****Credits: 3****CIE: 50%****SEE Hours: 3 Hrs****Course: Fundamentals of Electronics and Communication Engineering****L:T:P: 2:2:0****SEE: 50%****Total Marks:100**

<b>Prerequisites if any</b>	Semiconductor physics
<b>Learning objectives</b>	<ol style="list-style-type: none"> <li>1. Explain the physical principles underlying the operation of semiconductor devices such as diodes and transistors.</li> <li>2. Understand and apply Boolean algebra to simplify and analyze digital logic expressions.</li> <li>3. Define the basic components of a communication system: transmitter, channel, receiver.</li> </ol>

**Course Outcomes:**

*On the successful completion of the course, the student will be able to*

COs	Course Outcomes	Bloom's level
CO1	Understand the working principles, fundamental characteristics of various semiconductor devices including diodes and transistors.	L2
CO2	Analyse basic combinational circuits using the fundamental principles of digital systems.	L3
CO3	Describe the fundamental concepts of communication systems.	L2

**Mapping with POs and PSOs:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PSO1	PSO2	PSO3
CO1	3	2	2	-	1	-	-	-	-	2	1		3	2	2
CO2	3	2	2	-	1	-	-	-	-	2	1		3	2	2
CO3	3	2	2	-	1	-	-	-	-	2	1		3	2	2

**Mapping Strength:**      **Strong- 3**      **Medium - 2**      **Low - 1**

**Course Structure**

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
<b>Module – 1: Semiconductor Devices</b>				
1.1	Working principles of the following devices: PN Junction Diode, Zener Diode and Its Use in Voltage Regulation, Light Emitting Diode (LED), Photodiode.	2	0	0
1.2	Basic principles and characteristics of the following power devices: Silicon Controlled Rectifier (SCR).	1	2	0
1.3	TRIAC, DIAC and IGBT.	2	1	0
<b>Module – 2: Diodes and its Application</b>				
2.1	Introduction, Characteristics and Parameters	1	0	0
2.2	Diode Approximation, DC Load Line Analysis	1	0	0
2.3	Power supply block diagram	0	1	0
2.4	Half Wave Rectifier with and without Capacitor Filter Circuit (With derivation).	1	1	0
2.5	Full Wave Bridge Rectifier with and without Capacitor Filter Circuit (With derivation)	1	1	0
2.6	Clipper and clamper circuit.	1	0	0
<b>Module – 3: Bipolar Junction Transistors and Field Effect Transistor</b>				
3.1	Introduction, BJT Voltages & Currents, BJT Amplification, BJT Switching	1	0	0
3.2	Common Base Characteristics, Common Emitter Characteristics, BJT Biasing	1	0	0
3.3	Fixed Biasing and Voltage Divider, DC Load Line and Bias Point.	0	1	0
3.4	Junction Field Effect Transistor (N-Channel), JFET Characteristics	1	0	0
3.5	MOSFETS: Enhancement and Depletion mode MOSFETs	0	1	0
3.6	MOSFET characteristics	1	0	0
3.7	MOSFET as a Switch and Amplifier.	1	1	0

<b>Module – 4: Digital Systems and Binary Numbers</b>				
4.1	Digital Systems and Binary Numbers: Digital Systems, Numbering System (Binary, Octal, Decimal and Hexadecimal)	1	0	0
4.2	Number Base Conversion, 1's and 2's Complement Operation.	0	1	0
4.3	Signed Binary Numbers- Arithmetic Addition and Subtraction.	0	1	0
4.4	Boolean Algebra: Basic definition, Properties of Boolean Algebra, Boolean Functions	1	0	0
4.5	K-map, Canonical and Standard Forms	0	1	0
4.6	Digital Logic Gates, Adders- Half adder, Full adder	1	0	0
4.7	Multiplexer, demultiplexer	1	0	0
4.8	Encoder, decoder.	1	0	0
<b>Module – 5: Fundamentals of Communication</b>				
5.1	Communication systems block diagram, Communication Channels and their Characteristics: Wireline, Fiber Optic.	2	0	0
5.2	Wireless Electromagnetic Channels, Need for modulation.	1	1	0
5.3	Types modulation: AM, FM, PM, ASK, FSK, PSK (Qualitative)	2	0	0
5.4	Sampling Theorem, Nyquist criteria and Converting Analog Signal to Digital Signal Using PCM.	1	1	0
<b>Total No. of Lecture Hours</b>		<b>26</b>		
<b>Total No. of Tutorial Hours</b>		<b>14</b>		
<b>Total No. of Practical Hours</b>			<b>00</b>	

**Textbooks:**

1. D.P Kothari and I J Nagrath, Basic electronics, Second Edition, McGraw Hill Education Pvt ltd, 2018.
2. Power Electronics, P S Bimbra, Khanna Publishers.
3. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN- 978-81-203-0417-8

**Reference Books:**

1. Fundamentals of Microelectronics, Behazad Razavi, John Wiley & Sons, 2021
2. Microelectronics Circuits Theory and applications, Adel S Sedra, Kenneth C Smith, 7<sup>th</sup> edition Oxford University Press.
3. Microelectronics Circuit Analysis and Design, Donald A. Neaman, 4th edition, McGraw-Hill, 2010
4. John G. Proakis, Masoud Saleh, Fundamentals of Communication Systems, Second Edition, Pearson Educations, Inc., 2014.
5. Electronic Devices and Circuits, David A Bell, 5th Edition, Oxford, 2016

**Online Resources:**

1. <https://archive.nptel.ac.in/courses/108/105/108105158/>
2. <https://archive.nptel.ac.in/courses/108/106/108106105/>