Semester: I/II			
Course Title	Basic Electronics	**CIE Marks**	50
Course Code	BECESC103/203	**SEE Marks**	50
Course Type	Theory	**Total Marks**	100
Course Category	ESC	**SEE Duration**	03 hrs
Hours Per Week	3L: 0T: 0P	**SEE Type**	Written
Total Hours	40 hrs	**Credits**	03

Course Learning Objectives
This course will enable the students to understand
• Operation of Semiconductor diode, Zener diode and Special purpose diodes and their applications.
• Transistor (BJT) as an amplifier.
• Linear Op-amps and its applications.
• Logic circuits and their realization.
• Principles of Transducers and Communication.
Pre-Requisites
● Semiconductor Physics

Module-1	**(8 hrs)**
Semiconductor Diodes: Introduction, PN Junction diode, Characteristics and Parameters, Diode Approximations, DC Load Line analysis (**Text Book 1**: 2.1, 2.2, 2.3, 2.4) **Diode Applications:** Introduction, Half Wave Rectification, Full Wave Rectification, Power Supply: Capacitor Filter Circuit, RC π Filter (includes numerical) (**Text Book 1:**3.1, 3.2, 3.4, 3.5) **Zener Diodes:** Junction Break down, Circuit Symbol and Package, Characteristics and Parameters, Equivalent Circuit, Zener Diode Voltage Regulator. (**Text Book 1**:2.9, 3.7)	
Module-2	**(8 hrs)**
Bipolar Junction Transistors: Introduction, BJT Voltages & Currents, BJT Amplification, Common Base Characteristics, Common Emitter Characteristics, Common Collector Characteristics, BJT Biasing: Introduction, DC Load line and Bias point (**Text Book 1:** 4.2, 4.3, 4.5,4.6, 5.1) **Field Effect Transistor:** Junction Field Effect Transistor, JFET Characteristics, MOSFETs: Enhancement MOSFETs, Depletion Enhancement MOSFETs (**Text Book 1**: 9.1, 9.2, 9.5)	
Module-3	**(8 hrs)**
Operational Amplifiers: Introduction, The Operational Amplifier, Block Diagram Representation of Typical Op-Amp, Schematic Symbol, Op-Amp parameters - Gain, input resistance, Output resistance, CMRR, Slew rate, Bandwidth, input offset voltage, Input bias Current and Input offset Current, The Ideal Op-Amp, Equivalent Circuit of Op-Amp, Open Loop Op-Amp configurations, Differential Configuration, Inverting & Non Inverting Configuration. **Op-Amp Applications:** Inverting Amplifier, Non-Inverting Amplifier, Differential Amplifier, Voltage Follower, Integrator, Differentiator. (**Text Book 2**:1.1,1.2,1.3,1.5,2.2,2.3,2.4,2.6,6.5.1,6.5.2,6.5.3,6.12,6.13)	
Module-4	**(8 hrs)**
Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, Octal & Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (**Text Book 3**: 1.2, 1.3, 1.4, 1.5, 2.1,2.2,2.3, 2.4, 2.5, 2.6, 2.7)	

Combinational logic: Introduction, Design procedure, Adders-Half adder, Full adder (**Text Book 3**:4.1, 4.2, 4.3)
Module-5 **(8 hrs)**
Introduction to Transducers: Introduction, Resistive transducers, Inductive transducers, Capacitive transducers, Thermal transducers, Optoelectronic transducer, and Piezoelectric transducers (**Text Book 4**:18.1, 18.2, 18.3, 18.4, 18.5) **Communications:** Introduction to communication, Communication System, Modulation, AM, FM (No derivation) (**Text Book 5**: 1.1, 1.2, 1.3, 3.1, 5.1)

Text Books:	
1.	"Electronic Devices and Circuits", David A Bell, 5th Edition, Oxford, 2016
2.	"Op-amps and Linear Integrated Circuits", Ramakanth A Gayakwad,4th Edition, Pearson Education,
3.	"Digital Logic and Computer Design", M.Morris Mano, PHI Learning,2016
4.	"Electronic Instrumentation and Measurements", David A. Bell, 3rd Edition, Oxford University Press, 2013
5.	"Electronic Communication Systems", George Kennedy, 4th Edition, TMH,2009

Course Outcome Statements: After the successful completion of the course, the student will be able to	
CO1	Explain the operation of electronic devices and the principles of communication systems.
CO2	Apply the concepts of electronic devices for the construction of analog and digital circuits.
CO3	Analyze the characteristics / performance parameters of electronic devices and circuits for engineering applications.
CO4	Use modern tools to demonstrate the working of basic electronic circuits.

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		-	-	-	-	-	-	-	-	-	-
CO2	2		-	-	-	-	-	-	-	-	-	-
CO3	-	2	-	-	-	-	-	-	-	-	-	-
CO4	-		-	-	2	-	-	-	2	2	-	2
Avg.	**2**	**2**	-	-	**2**	-	-	-	**2**	**2**	-	**2**

3: High, 2: Medium, 1: Low

Suggested Activity Based Assessment (ABA) Methods

Student should make demonstration of the following circuits using simulation software (MultiSim/Pspice/Proteus /Any other circuit simulator)

- Half / full-wave rectifier using diodes.
- Transistor as a switch to turn ON / OFF LED.
- Op-amp circuits – inverting, non-inverting amplifiers, Voltage follower, Integrator, Differentiator.
- Realization of Half adder and Full adder.
- AM and FM modulation and demodulation.