Course Title:	**Basic Electronics**	Semester	I /II
Course Code:	**BBEE103 /203**	CIE Marks	50
Course Type (Theory)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course Learning Objectives

CLO 1. Operation of Semiconductor diode, Zener diode and their applications

CLO 2. Biasing circuits for transistor (BJT) as an amplifier
CLO 3. Study of linear Op-amps and its applications.
CLO 4. Logic circuits and their optimization
CLO 5. Principles of Transducers and Communication

Teaching-Learning Process
1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the functioning of various analog and digital circuits.
3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
4. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
5. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module-1:Semiconductor Diodes, Diode Applications, **Zener Diodes (8hours)**

Self-study: How intrinsic and extrinsic semiconductors work, applications of different types of diode

Semiconductor Diodes**:** Introduction, PN Junction diode, Characteristics and Parameters, Diode Approximations, DC Load Line analysis

Diode Applications**:** Introduction, Half Wave Rectification, Full Wave Rectification, Full Wave Rectifier Power Supply: Capacitor Filter Circuit

Zener Diodes: Junction Breakdown, Circuit Symbol and Package, Characteristics and Parameters, Equivalent Circuit, Zener Diode Voltage Regulator

Applications: stabilize voltage and current in electronic systems, rectify alternating current , isolate signals from a supply
(RBT Levels: L2, L3 and L4)

Module-2: Bipolar Junction Transistors , Field Effect Transistor
Self-study: Doping, Biasing, Voltage, Current, composition, operation, working of FETs
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 1
Field Effect Transistor: Junction Field Effect Transistor, JFET Characteristics, MOSFETs: Enhancement MOSFETs, Depletion Enhancement MOSFETs.
Applications: Amplifications, Switching, Oscillators, Filters, Demodulators, Choppers
(RBT Levels: L2, L3 and L4)

Module-3 : Operational Amplifiers , Op-Amp Applications (8 hours)
Self-study: Input offset voltage, Bandwidth, Voltage
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 Amplifier, Inverting & Non Inverting Amplifier
Op-Amp Applications: Inverting Configuration, Non-Inverting Configuration, Differential Configuration, Voltage Follower, Integrator, Differentiator
Applications: Voltage follower, selective inversion circuit, a current-to-voltage converter, active rectifier, integrator, a whole wide variety of filters, and a voltage comparator
(RBT Levels: L2, L3 and L4)

Module-4: Boolean Algebra and Logic Circuits, Combinational logic (8hours)
Self-study: Truth values, Logic operators, Variables, Complements
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
Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder
Applications: Digital Computers, Digital Calculators, Digital signal processing, Robotics, Digital Communications
(RBT Levels: L2, L3 and L4)

Module-5: Introduction to Transducers, Communications (8 hours)
Self-study: Functional Element of transducers, Variable conversion element, manipulation element
Introduction to Transducers: Introduction, Resistive Transducers, Inductive Transducers, Capacitive Transducers, Thermal transducers, Optoelectronic transducer, and Piezoelectric transducers
Communications: Introduction to communication, Communication System, Modulation
Applications: Microphones, Speakers, Antennas, Strain Gauges
(RBT Levels: L2, L3 and L4)

Course outcome

At the end of the course, the student will be able to :
1. Use the conceptual knowledge to understand the basics of electronic devices and communication system
2. Apply the knowledge and analyze the operational characteristics of BJTs, FETs, Op-Amp and its Applications
3. Apply the competence knowledge to Analyze the basic digital circuit and its function
4. Analyze the applications of transducers principle in sensor system

Course Assessment and Evaluation Details (both CIE and SEE)

Continuous Internal Evaluation: 50 marks

Theory Assessment Tool	Marks	Reduced marks
IAT-1	25	25
IAT-2	25	
Assessment -1(activity based)	25	25
Assessment-2(activity based)	25	

Semester End Examination (SEE) : 50 marks

SEE	Marks	Reduced marks
Course end examination (Answer any one question from each unit – Internal choice)	100	50

Suggested Learning Resources:

Text Books

1.. Electronic Devices and Circuits, David A Bell, 5th Edition, Oxford, 2016

2. Op-amps and Linear Integrated Circuits, Ramakanth A Gayakwad, Pearson Education, 4th Edition

3. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-8

Reference Books:

1. Electronic Instrumentation and Measurements (3rd Edition) – David A. Bell, Oxford University Press, 2013

2. Electronic Communication Systems, George Kennedy, 4th Edition, TMH

Web links and Video Lectures (e-Resources):
• https://nptel.ac.in/courses/122106025
• https://nptel.ac.in/courses/108105132
• https://nptel.ac.in/courses/117104072

COs and POs Mapping (CO-PO mappings are only Indicative)
Level 3- Highly Mapped, Leel 2-Moderately Mapped,   Level 1-Low Mapped,   Level 0- Not Mapped

COs	POs												PSO's
	1	2	3	4	5	6	7	8	9	10	11	12	1
CO1	3	3	2	1								2	3
CO2	3	3	2	1								2	3
CO3	3	3	2	1						3		2	3
CO4	3	2	2	1								2	3