B.E ELECTRONICS AND COMMUNICATION ENGINEERING
Choice Based Credit System (CBCS)
SEMESTER – I/II

Introduction to Electronics Engineering (3:0:0) 3
ESC-I
(Common to: CSE/ME/EEE/CIV/AIML/CSBC)
(Effective from the Academic Year 2024-25)

Course Code:	**BESC14C/BESC24C**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	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 objectives:
This Course will enable students to:
1. To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering.
2. To equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems.
3. Professionalism & Learning Environment: To inculcate in first-year engineering studentsan ethical and professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social context, and life-long learning needed for a successful professional career.

Preamble:
Introduction to electronics course equip with the knowledge of exploring fundamental concept in the field of electronics. It deals about diodes, BJTs, FET's and digital electronics concepts such as gates and Boolean algebra. It also highlights the amplifiers, oscillators and operational amplifiers.

Module-1

Semiconductor Diodes: Introduction, PN Junction diode, Characteristics and Parameters, Text 1: 2.1,2.2)

Diode Applications: Introduction, Half Wave Rectification, Full Wave Rectification, Full Wave Rectifier Power Supply: Capacitor Filter Circuit, RC π filter (Text 1: 3.1,3.2,3.4,3.5)
Zener Diodes: Zener Diode, Characteristics and Parameters,Zener Diode Voltage Regulator.
(Text1:2.9, 3.7)

(8 Hours)

Module-2
Bipolar Junction Transistors: Introduction, BJT Voltages & Currents, Common Emitter Characteristics, BJT as a Switch. (Text 1: Chapter 4) **Field Effect Transistor:** MOSFETs: Enhancement MOSFETs, Depletion Enhancement MOSFETs, CMOS as an inverter (Text 1: 9.1,9.2,9.5) **(8 Hours)**
Module-3
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 (Text 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). **(8 Hours)**
Module-4
Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, octal & HexaDecimal Numbers, Complements, Basic definitions, Boolean Algebra, Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms,Other Logic Operations, Digital Logic Gates (Text 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 3:4.1, 4.2, 4.3) **(8 hours)**
Module-5
Embedded Systems – Definition, Embedded systems vs general computing systems, Classificationof Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC. **Sensors and Interfacing –** Instrumentation and control systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display. (Text 4) **(8 hours)**

Suggested Learning Resources:
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

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
4. K V Shibu, 'Introduction to Embedded Systems', 2nd Edition, McGraw Hill Education (India),Private Limited, 2016

Course outcome (Course Skill Set)

At the end of the course the student will be able to:
CO1: Apply the acquired knowledge to construct basic electronic circuits
CO2: Analyze acquired knowledge of semiconductor physics in electronic system for a given application
CO3: Design the basic electronics circuits for a given specification to address engineering applications
CO4: Demonstrate the working of electronic circuits for different applications with the help of modern tools and write report in a group.

Alternate Assessment Tools (AATs) suggested:
- Virtual lab program execution and report submission.
- Simulation of electronic circuits using modern tools.

Web links and E-resources:
1. http://vlabs.iitkgp.ernet.in/be/index.html#
2. https://de-iitr.vlabs.ac.in/List%20of%20experiments.html
3. https://ae-iitr.vlabs.ac.in/List%20of%20experiments.html
4. https://he-coep.vlabs.ac.in/List%20of%20experiments.html
5. https://onlinecourses.nptel.ac.in/noc21_ee55/preview
6. https://nptel.ac.in/courses/122106025
7. https://nptel.ac.in/courses/108105132
8. https://nptel.ac.in/courses/117104072