Semester: I/II			
Course Title	Introduction to Electronics & Communication	**CIE Marks**	50
Course Code	BECESC104/204C	**SEE Marks**	50
Course Type	Theory	**Total Marks**	100
Course Category	ESC	**SEE Duration**	03 hrs
Hours Per Week	2L : 2T : 0P	**SEE Type**	Written
Total Hours	40 hrs	**Credits**	03

Course Learning Objectives
This course will enable the students to understand
• Operation of Power Supply and Amplifiers.
• Principles of operation of Oscillators and Op-amps.
• Logic circuits and their realization.
• Embedded Systems and Sensors.
• Principles of Communication and Modulation Schemes
Pre-Requisites
• Semiconductor Physics

Module-1	**(8 hrs)**
Power Supplies: Block diagram, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers. **Amplifiers:** Types of amplifiers, Gain, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback, multi-stage amplifiers (**Text Book 1**: 6, 7)	
Module-2	**(8 hrs)**
Oscillators: Barkhausen criterion, Sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge oscillator, Multivibrators, Single-stage stable oscillator, Crystal controlled oscillators (Only Concepts, working and waveforms. No mathematical derivations) **Operational amplifiers:** Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits. (**Text Book 1**:8, 9)	
Module-3	**(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 2**: 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 2**:4.1, 4.2, 4.3)	
Module-4	**(8 hrs)**
Embedded Systems: Definition, Embedded Systems v/s general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor v/s Microcontroller, RISC v/s CISC **Sensors and Interfacing:** Instrumentation and Control Systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display. (**Text Book 3**: 1.1, 1.2, 1.3, 1.4, 1.5, 2.3)	

Module-5	(8 hrs)
Analog Communication Schemes: Modern Communication System, Information Source, and input transducer, Transmitter, Channel or Medium – Hardwired and Softwired, Noise, Receiver, Multiplexing, Types of Communication Systems. Types of modulation (only concepts) – AM, FM, Concept of Radio wave propagation (Ground, Space, Sky) **Digital Modulation Schemes**: Advantages of digital communication over analogue communication, ASK, FSK, PSK, Radio signal transmission, Multiple access techniques. (**Text Book 4**: 1.2 to 1.6, 1.9, 1.14, 1.15, 2.2, 3.2, 6.12, 6.13, 6.15, 6.16, 7.2, 7.3 and 7.5).	

Text Books:	
1.	"Electronic Circuits, Fundamentals & Applications", Mike Tooley, 4th Edition, Elsevier, 2015, DOI https://doi.org/10.4324/9781315737980. eBook ISBN9781315737980
2.	"Digital Logic and Computer Design", M. Morris Mano, PHI Learning, 2008
3.	"Introduction to Embedded Systems", K V Shibu, 2nd Edition, McGraw Hill Education (India), Private Limited, 2016
4.	"Communication Systems", S L Kakani and Priyanka Punglia, New Age International Publisher, 2017.

Course Outcome Statements: After the successful completion of the course, the student will be able to	
CO1	Explain the operation of electronic devices, the principles of communication systems and fundamentals of Embedded 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 different applications.
CO4	Use modern tool 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

Students should make demonstration of the following circuits using simulation software (MultiSim / Pspice / Proteus)

- Half / full-wave rectifier using diodes
- Voltage multipliers
- Op-amp circuits – inverting, non-inverting amplifiers, summers, differentiators, oscillators.
- Realization of Half adder and Full adder
- AM and FM modulation and demodulation.