K. S. INSTITUTE OF TECHNOLOGY

An Autonomous Institution under VTU, Approved by AICTE

Department of Electronics & Communication Engineering

FIRST / SECOND SEMESTER SYLLABUS

Course : Introduction to Electronics and Communication Engineering		Semester	I/II
Course Code	**25BESC 104C /204C**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course Objectives (Course Skill Set)

1. Understand the working of the basic electronic devices and circuits using the principles of rectifiers, voltage regulators, transistors and amplifiers.
2. Analyze the behaviour of analog circuits including oscillators and operational amplifiers in signal generation and conditioning applications.
3. Apply the number system conversions and Boolean algebra to design and implement basic combinational logic circuits.
4. Interpret the structure and functionality of embedded systems and digital logic components such as microcontrollers and sensors.
5. Illustrate the fundamental concepts of analog and digital modulation techniques based on their characteristics and suitability for communication systems.

Module-1

Semiconductor Diodes and Transistors: Introduction, PN Junction diode, Characteristics and Parameters, Half-wave rectifier, Full-wave rectifiers and filters. Introduction to Bipolar Junction Transistors and its Applications.

Power Supplies and Amplifiers – Block diagram, Voltage regulators, Improved Ripple Filter Output resistance and voltage regulation.

Types of amplifiers, Gain, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback, multi-stage amplifiers.
(Text 1: Page No:91-93,98-100,117-128, 139-146)

Number of Hours:8

Module-2

Oscillators –Introduction, Types of Oscillators, Positive feedback, Barkhausen criterion, Wein bridge oscillator, Ladder network, Multivibrators, Single-stage a stable oscillator**,** Crystal controlled oscillators (Only Concepts, working, and waveforms. No mathematical derivations)
(Text 1: Page No:175-186)

Operational amplifiers - Introduction, Block Diagram Representation of Typical Op-Amp, Schematic Symbol, Operational amplifier parameters, characteristics, configurations, and circuits. (Text 2: Page No:1-8), (Text 1: Page No:160-170)

Number of Hours:8

Module-3

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 4: 1.2, 1.3, 1.4, 1.5,2.1, 2.2, 2.3, 2.4, 2.5, 2.5, 2.5, 2.6, 2.7)

Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder
(Text 3: 1.2, 1.3, 1.4, 1.5, 2.1, 2.3, 2.4, 2.5, 2.7, 4.1, 4.2, 4.3.) **Number of Hours:8**

Module-4

Embedded Systems – Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Purpose of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor Vs ASIP, Microcontroller, Microprocessor vs Microcontroller, DSP,RISC vs CISC.

Memory: R O M , Sensors, Actuators, LED, 7-Segment LED Display.
(Text 4: 1.1, 1.2, 1.4, 1.5, 1.6, 2.1.1.1-2.1.1.6, 2.2.1, 2.3.1, 2.3.2, 2.3.3.1, 2.3.3.2.)
Number of Hours:8

Module-5

Analog Communication Schemes – Modern communication system scheme, Information source, and input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM, Angle Modulation, Concept of Radio wave propagation (Ground, space, sky).

Digital Modulation Schemes: Advantages of digital communication over analog communication, ASK, FSK, PSK.
(Text 5: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.9, 1.12, 1.15, 2.2.1, 3.2.1, 6.11, 6.12, 6.13, 6.15, 6.16)
Number of Hours:8

Course outcome (Course Skill Set)
At the end of the course, the student will be able to:

CO1: Make use of the characteristics of semiconductor devices (diodes and transistors) to identify their applications as rectifiers, filters, power supplies, and amplifiers.

CO2: Explain the operation of oscillators and operational amplifiers and apply feedback concepts to develop amplifier and oscillator circuits.

CO3: Apply Boolean algebra theorems to solve logic expressions and basic combinational logic circuits.

CO4: Explain the concepts embedded systems and the role of memory to model as sensors, actuators, and display devices in real-time applications.

CO5: Explain the principles of analog and digital communication systems to illustrate different modulation techniques, multiplexing methods, noise effects, and propagation modes.

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

1. Electronics Circuits : Fundamentals and applications, Mike Tooley,5th Edition
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.
5. S L Kakani and Priyanka Punglia, 'Communication Systems', New Age International Publisher, 2017.

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/courses/122106025
- https://nptel.ac.in/courses/108105132

Teaching-Learning Process (Innovative Delivery Methods)

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching- learning process and facilitate the achievement of course outcomes.

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.

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

- To qualify and become eligible to appear for SEE, in the **CIE**, a student must score at least **40% of 50 marks**, i.e., **20 marks**.
- To pass the **SEE**, a student must score at least **35% of 50 marks**, i.e., **18 marks**.

Notwithstanding the above, a student is considered to have **passed the course,** provided the combined total of **CIE and SEE is at least 40 out of 100 marks**.

Continuous Comprehensive Evaluation (CCE):

CCE will be conducted for a total of 25 marks. It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students. These activities should align with course objectives and promote higher-order thinking and application-based learning.

Learning Activity 1: (Marks 25): Two assignments (for 10marks and 15marks) related to simulation of simple circuits (using any simulation tool such as LT Spice, KI Cad etc.), at RBL3, RBL4, or RBL5 levels, assignment reports should include circuit design, schematic, and simulation results.

Suggested Learning Activities may include (but are not limited to):

- **Learning Activity -1:** Course Project
- **Learning Activity -2:** Open Book Test (preferably at RBL4 and RBL5 levels)
- **Learning Activity -3:** Assignment (at RBL3, RBL4, or RBL5 levels)
- **Learning Activity -4:** Any other relevant and innovative academic activity
- **Learning Activity -5:** Use of MOOCs and Online Platforms

Suggest Innovative Deliver Methods may include (but are not limited to):

- Flipped Classroom
- Problem-Based Learning (PBL)
- Case-Based Teaching
- Simulation and Virtual Labs
- Partial Delivery of course by Industry expert/ industrial visits