BASIC ELECTRONICS

Sub Code	:	**14ELN15 / 14ELN25**	**IA Marks**	**:25**
Hrs/ Week	:	**04**	**Exam. Hours**	**:03**
Total Hrs.	:	**50**	**Exam. Marks**	**:100**

Course Objectives :
The course objective is to make students of all the branches of Engineering to understand the efficacy of Electronic principles which are pervasive in engineering applications.

Module – 1

Semiconductor Diodes and Applications (Text-1) : p-n junction diode, Characteristics and Parameters, Diode approximations, DC load line analysis, Half-wave rectifier, Two-diode Full-wave rectifier, Bridge rectifier, Capacitor filter circuit, Zener diode voltage regulators: Regulator circuit with no load, Loaded Regulator, Series and Shunt diode Clipping Circuits, Clamping Circuits: Negative and Positive Clamping Circuits, Numerical examples as applicable. **6 Hours**

Bipolar Junction Transistors : BJT operation, BJT Voltages and Currents, BJT amplification, Common Base, Common Emitter and Common Collector Characteristics, Numerical examples as applicable. **4 Hours**

Module – 2

BJT Biasing (Text-1) : DC Load line and Bias Point, Base Bias, Voltage divider Bias, Numerical examples as applicable. **4 Hours**

Introduction to Operational Amplifiers (Text-2) : Ideal OPAMP, Inverting and Non Inverting OPAMP circuits, OPAMP applications: voltage follower, addition, subtraction, integration, differentiation; Numerical examples as applicable. **6 Hours**

Module – 3

Digital Electronics (Text-2) : Introduction, Switching and Logic Levels, Digital Waveform (Sections 9.1to 9.3). Number Systems: Decimal Number System, Binary Number System, Converting Decimal to Binary, Hexadecimal

Number System: Converting Binary to Hexadecimal, Hexadecimal to Binary, Converting Hexadecimal to Decimal, Converting Decimal to Hexadecimal, Octal Numbers: Binary to Octal Conversion. Complement of Binary Numbers. Boolean Algebra Theorems, De Morgan's theorem. Digital Circuits: Logic gates, NOT Gate, AND Gate, OR Gate, XOR Gate, NAND Gate, NOR Gate, X-NOR Gate. Algebraic Simplification, NAND and NOR Implementation (Sections 11.7 and 11.8): NAND Implementation, NOR Implementation. Half adder, Full adder. **10 Hours**

Module – 4

Flip-Flops (Text-2) : Introduction to Flip-Flops (Section 12.1), NAND Gate Latch/ NOR Gate Latch, RS Flip-Flop, Gated Flip-Flops: Clocked RS Flip-Flop (Sections 12.3 to 12.5). **2 Hours**

Microprocessors and Microcontrollers : (Ref.1 and Ref.2): Introduction to Microprocessors, 8085 Microprocessor Architecture and working. Introduction to Microcontrollers, 8051 Microcontroller Architecture and working. **4 Hours**

Transducers (Text-2) : Introduction, Passive Electrical Transducers, Resistive Transducers, Resistance Thermometers, Thermistor. Linear Variable Differential Transformer (LVDT). Active Electrical Transducers, Piezoelectric Transducer, Photoelectric Transducer. **4 Hours**

Module – 5

Communication Systems (Text-2) : Introduction, Elements of Communication Systems, Modulation: Amplitude Modulation, Spectrum Power, AM Detection (Demodulation), Frequency and Phase Modulation. Amplitude and Frequency Modulation: A comparison. **6 Hours**

Telephone Systems and Optical Fibre Communication : Telephone Systems, Principle of operations of Mobile phone, ISDN, Block diagram of Optical Fibre Communication, Principle. Advantages of Optical Fibre communication, Applications of Optical Fibre communication. **4 Hours**

Course Outcomes :

After studying this course, students will be able to:

- Appreciate the significance of electronics in different applications,

- Understand the applications of diode in rectifiers, filter circuits and wave shaping,
- Design simple circuits like amplifiers (inverting and non inverting), comparators, adders, integrator and differentiator using OPAMPS,
- Understand the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates.
- Understand the basic architecture and functioning of microprocessor and microcontrollers
- Understand the functioning of a communication system and different modulation technologies, and
- Understand the basic principles of different types of Transuducers.

Scheme of examination :

- **Two full questions (with a maximum of four sub questions) of twenty marks each to be set from each module. Each question should cover all contents of the respective module.**
- **Students have to answer five full questions choosing one full question from each module**

Text Books :

1. David A. Bell, **"Electronic Devices and Circuits"**, Oxford University Press, 5th Edition, 2008.
2. D.P. Kothari, I. J. Nagrath, **"Basic Electronics"**, McGraw Hill Education (India) Private Limited, 2014.

Reference Books :

1. R.S.Goankar, **"Microprocessor Architecture, Programming and Applications with 8085"**, 6th Edition, Prentice Hall, 2013
2. MuhammadAli Mazidi, **"The 8051 Microcontroller and Embedded. Systems. Using Assembly and C."** Second Edition, 2011.

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