BASIC ELECTRONICS

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2015 -2016)

SEMESTER - I/II

Subject Code	15ELN15 / 15ELN25	IA Marks	20
Number of Lecture Hours/Week	04	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS - 04

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	**Teaching Hours**
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 (only qualitative approch), Zener diode voltage regulators: Regulator circuit with no load, Loaded Regulator. Numerical examples as applicable. **Bipolar Junction Transistors:** BJT operation, BJT Voltages and Currents, BJT amplification, Common Base, Common Emitter and Common Collector Characteristics, Numerical examples as applicable.	**06 Hours** **04 Hours**
Module -2	
BJT Biasing (Text-1): DC Load line and Bias Point, Base Bias, Voltage divider Bias, Numerical examples as applicable. **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.	**04 Hours** **06 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).	**05 Hours**
Microcontrollers (Ref.1)**:** Introduction to Microcontrollers, 8051 Microcontroller Architecture and an example of Microcontroller based stepper motor control system (only Block Diagram approach).	**05 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.	**06 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.	**04 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,
- Apply the concept of diode in rectifiers, filters circuits
- Design simple circuits like amplifiers (inverting and non inverting), comparators, adders, integrator and differentiator using OPAMPS,
- Compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates, and
- Understand the functioning of a communication system, and different modulation technologies, and
- Understand the basic principles of different types of Transuducers.

Question paper pattern:

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be **2** full questions(with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting 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: MuhammadAli Mazidi, **"The 8051 Microcontroller and Embedded. Systems. Using Assembly and C."** Second Edition, 2011, Pearson India.

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