

BASIC ELECTRONICS			
[As per Choice Based Credit System (CBCS) scheme]			
SEMESTER – I/II			
Course Code	18ELN14/24	CIE Marks	40
Number of Lecture Hours/Week	03 (02 + 01 Tutorial)	SEE Marks	60
Total Number of Lecture Hours	40 (08 Hours per Module)	Exam Hours	03
Credits – 03			
Course objectives: This course will enable students to:			
<ul style="list-style-type: none"> • Understand characteristics, operation and applications of the diodes, bipolar junction transistors, field effect transistors, SCRs and operational amplifiers in electronic circuits. • Understand different number systems and working of fundamental building blocks of digital circuits. • Understand the principle of basic communication system and mobile phones. 			
Modules			RBT Levels
Module-1			
<p>Semiconductor Diodes and Applications: p-n junction diode, Equivalent circuit of diode, Zener Diode, Zener diode as a voltage regulator, Rectification-Half wave rectifier, Full wave rectifier, Bridge rectifier, Capacitor filter circuit (2.2, 2.3, 2.4 of Text 1). Photo diode, LED, Photocoupler. (2.7.4, 2.7.5, 2.7.6 of Text 1). 78XX series and 7805 Fixed IC voltage regulator (8.4.4 and 8.4.5 of Text 1).</p>			L1, L2, L3
Module-2			
<p>FET and SCR: Introduction, JFET: Construction and operation, JFET Drain Characteristics and Parameters, JFET Transfer Characteristic, Square law expression for I_D, Input resistance, MOSFET: Depletion and Enhancement type MOSFET- Construction, Operation, Characteristics and Symbols, (refer 7.1, 7.2, 7.4, 7.5 of Text 2), CMOS (4.5 of Text 1). Silicon Controlled Rectifier (SCR) – Two-transistor model, Switching action, Characteristics, Phase control application (refer 3.4 upto 3.4.5 of Text 1).</p>			L1, L2, L3

Module-3	
<p>Operational Amplifiers and Applications: Introduction to Op-Amp, Op-Amp Input Modes, Op-Amp Parameters-CMRR, Input Offset Voltage and Current, Input Bias Current, Input and Output Impedance, Slew Rate (12.1, 12.2 of Text 2). Applications of Op-Amp -Inverting amplifier, Non-Inverting amplifier, Summer, Voltage follower, Integrator, Differentiator, Comparator (6.2 of Text 1).</p>	L1, L2, L3
Module-4	
<p>BJT Applications, Feedback Amplifiers and Oscillators: BJT as an amplifier, BJT as a switch, Transistor switch circuit to switch ON/OFF an LED and a lamp in a power circuit using a relay (refer 4.4 and 4.5 of Text 2). Feedback Amplifiers – Principle, Properties and advantages of Negative Feedback, Types of feedback, Voltage series feedback, Gain stability with feedback (7.1-7.3 of Text 1). Oscillators – Barkhausen's criteria for oscillation, RC Phase Shift oscillator, Wien Bridge oscillator (7.7-7.9 of Text 1). IC 555 Timer and Astable Oscillator using IC 555 (17.2 and 17.3 of Text 1).</p>	L1, L2, L3
Module-5	
<p>Digital Electronics Fundamentals: Difference between analog and digital signals, Number System- Binary, Hexadecimal, Conversion- Decimal to binary, Hexadecimal to decimal and vice-versa, Boolean algebra, Basic and Universal Gates, Half and Full adder, Multiplexer, Decoder, SR and JK flip-flops, Shift register, 3 bit Ripple Counter (refer 10.1-10.7 of Text 1). Basic Communication system, Principle of operations of Mobile phone (refer 18.2 and 18.18 of Text 1).</p>	L1, L2
<p>Course Outcomes: After studying this course, students will be able to:</p> <ul style="list-style-type: none"> • Describe the operation of diodes, BJT, FET and Operational Amplifiers. • Design and explain the construction of rectifiers, regulators, amplifiers and oscillators. • Describe general operating principles of SCRs and its application. • Explain the working and design of Fixed voltage IC regulator using 7805 and Astable oscillator using Timer IC 555. • Explain the different number system and their conversions and construct simple combinational and sequential logic circuits using Flip-Flops. • Describe the basic principle of operation of communication system and 	

mobile phones.

Proposed Activities to be carried out for 10 marks of CIE:

Students should construct and make the demo of the following circuits in a group of 3/4 students:

1. +5v power supply unit using Bridge rectifier, Capacitor filter and IC 7805.
2. To switch on/off an LED using a Diode in forward/reverse bias using a battery cell.
3. Transistor switch circuit to operate a relay which switches off/on an LED.
4. IC 741 Integrator circuit/ Comparator circuit.
5. To operate a small loud speaker by generating oscillations using IC 555.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Text Books:

1. D.P.Kothari, I.J.Nagarath, "Basic Electronics", 2nd edn, McGraw Hill, 2018.
2. Thomas L. Floyd, "Electronic Devices", Pearson Education, 9th edition, 2012.

Reference Books:

1. D.P.Kothari, I.J.Nagarath, "Basic Electronics", 1st edn, McGraw Hill, 2014.
2. Boylestad, Nashelskey, "Electronic Devices and Circuit Theory", Pearson Education, 9th Edition, 2007/11th edition, 2013.
3. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, 2008.
4. Muhammad H. Rashid, "Electronics Devices and Circuits", Cengage Learning, 2014.