

Programme: B. Tech. (ECE, CSE, CCE, ME) B.Tech.-M.Tech Integrated (CSE, ECE)	Course Title: Basic Electronics			Course Code: EC111
Type of Course: Program Core	Prerequisites: Nil			Total Contact Hours: 40
Year/Semester: 1/odd	Lecture Hrs/Week: 3	Tutorial Hrs/Week: 1	Practical Hrs/Week: 0	Credits: 4

Learning Objective:

This course is the foundation of most of the other courses in the electrical and electronics engineering domain. This course helps, while gaining in-depth knowledge, to understand other courses in a much easier way. The objective of the course is that the students would appreciate the significance of electronic circuits in different applications. Understand and apply different Network theorems to analyze and design the circuits. The student would be able to analyze the time and frequency domain characteristics of systems. Compile the different building blocks in digital electronics using logic gates and implement the simple logic function using basic universal gates.

Course outcomes (COs):

On completion of this course, the students will be able to:		Bloom's Level
CO-1	Interpret network theorems in an electrical circuits	2
CO-2	Analyze different circuits in the AC Domain	4
CO-3	Examine time and frequency domain analysis of RLC circuits.	4
CO-4	Build basic circuits using diodes, BJT and Op-Amps	3
CO-5	Make use of Boolean algebra and K-maps to obtain Boolean expressions.	3
CO-6	Analyze basic combinational and sequential circuits.	4

Course Topics	Lecture Hours	
UNIT – I (Network Theorems)	9	CO1
1.1. Basic electrical components and circuits, Voltage, power and energy, circuit elements, DC and AC sources, basic definitions of nodes, branches and loops, Ohm's and Kirchhoff's laws, passive components (R, L, and C), voltage and current divisions, delta to star and star to delta conversions.	3	
1.2. Nodal and mesh analysis with and without independent and dependent sources.	3	
1.3. Superposition theorem, source transformation, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem.	3	
UNIT – II (Passive Circuit Analysis)	11	

2.1. Introduction to Laplace transform, Phasor analysis, complex frequency	3	CO2, CO3
2.2. Time domain response of source free RC and RL circuits, unit step function, the step response of RC and RL circuits.	5	
2.3 Determining initial and final values, source free series RLC circuit, source free parallel RLC circuit, the step response of series and parallel RLC circuits, mixed type RLC circuits.	3	
UNIT – III (Active Circuit)		
3.1 Diodes and diode characteristic, BJT based amplifier, BJT as a switch, input/output impedance, gain, amplifier with feedback.	3	CO4
3.2. Basic details of operational amplifiers (Op-Amps), ideal Op-Amp, inverting and non-inverting amplifier, Op-Amp circuits, applications of Op-Amp(summing and difference amplifiers, integrator, differentiator circuits, schmitt trigger, zero crossing detector, voltage follower)	5	
UNIT-IV (Number Systems and Boolean Algebra)		
4.1. Binary numbers, number base conversion: decimal, octal, hexadecimal, and any other base, compliments, binary codes (gray, ASCII)	2	CO5
4.2. Boolean algebra, Boolean functions, canonical and standard forms, optimization methods (using Boolean algebra and K-map up-to 4 variables).	3	
UNIT-V (Digital Circuits)		
5.1. Combinational Circuits, Adder, subtractor, decoder, encoder, MUX, DEMUX, multiplier, comparator	4	CO6
5.2. Sequential circuits latches and RS, D, JK, and T flip-flops.	3	

Textbook References:

Text Book:

1. *Fundamentals of Electric Circuits*, Charles Alexander, and Matthew. Sadiku, McGraw-Hill.
2. *Foundation of Electrical Engineering*, Leonard S Bobrow, Oxford University Press.
3. *Digital Design*, M. Morris Mano, Prentice Hall

Reference books:

1. *Microelectronic Circuits*, Sedra and Smith, Oxford University Press.
2. *Digital Integrated Electronics*, Herbert Taub and Donald Schilling, McGraw Hill, New York, 1977.
3. *Linear Circuits Analysis and Synthesis*, A. Ramkalyan, Oxford University Press, 2005.
4. *Basic Circuit Analysis*, D. R. Cunningham and J. A. Stuller, published by Jaico Publishing House, Mumbai, 1996.

Additional Resources: <https://nptel.ac.in/courses/122106025>

Evaluation Method		Associated Cos
Item	Weightage (%)	
Quiz 1	10	CO1, CO2
Quiz 2	10	CO2,CO3
Quiz 3	10	CO4
Assignment	10	CO1, CO2, CO3, CO4, CO5, CO6
Midterm	20	CO1, CO2, CO3
Final Examination	40	CO1, CO2, CO3, CO4, CO5, CO6

*Please note, as per the existing institute's attendance policy the student should have a minimum of 75% attendance. Students who fail to attend a minimum of 75% lectures will be debarred from the End Term/Final/Comprehensive examination.

CO and PO Correlation Matrix for B.Tech ECE and B.Tech-M.Tech Integrated Program in ECE

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PS O1	PSO 2	PSO 3
CO1	3	2			2			1	1	2		1	3	1	1
CO2	3	3	1		2			1	1	2		1	3	1	1
CO3	3	3	2		2			1	1	2		1	3	1	1
CO4	3	2	1	1								1	3	1	1
CO5	3	3	1									1	3	1	1
CO6	3	3	1	1								1	3	1	1

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Updated By:

Approved By: