

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	B Tech Electronics and Instrumentation Engineering
Course Code:	2EI601CC25
Course Title:	Basic Electronics
Course Type:	Core
Year of Introduction:	2025-26

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Course Learning Outcomes (CLOs):

At the end of the course, students will be able to –

1. explain the concept of analog and digital circuits. (BL2)
2. analyse the sequential and analog circuit (BL4)
3. implement the sequential circuits. (BL5)
4. build digital and analog circuits using integrated circuits. (BL6)

Unit	Contents	Teaching hours (Total 30)
Unit- I	Introduction to Analog & Digital electronics Analog signals, Digital signals, Sampling, Quantization, Binary codes, Boolean expressions, Combinational circuits, basics of diode and transistor.	05
Unit- II	Sequential Logic Circuits Flip-flops, triggering of Flip-flops, State reduction and assignments, Flip-flop excitation tables, Conversion of flip-flops.	08
Unit- III	Registers, Counters and Algorithmic State Machines Registers, Shift registers, Ripple counters, Synchronous counters, ASM chart.	08
Unit- IV	Logic Families Digital IC specification terminology, RTL, DTL, IIL, TTL, CMOS.	03
Unit- V	Operational Amplifier Fundamentals of operational amplifier, Operational amplifier Characteristics, Feedback configurations of operational amplifiers, Op-amp parameters.	06

Self-Study: The self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work: Laboratory work will be based on above syllabus with minimum 10 experiments/exercises to be incorporated.

Suggested Readings:

1. M. Morris Mano, Digital Logic and Computer design, PHI publication.
2. Norman Balabanian and Bradley Carlson, Digital Logic Design Principles, Wiley Student Edition.
3. Robert Boylestad, Electronic devices and circuit theory, Pearson Education.
4. R.A.Gayakwad, Op amp & Linear Integrated Circuits, Prentice- Hall.
5. Millman-Halkias, Integrated Electronics- Analog and Digital circuits and systems, Mc-Graw Hill.

Suggested List of Experiments:

Sr. No.	Name of Experiments/Exercises	Hours
1.	To implement Binary to Gray code converter.	02
2.	To realize Boolean function using multiplexer	02
3.	To verify characteristic tables of JK, D and T flip-flops	02
4.	To implement Flip-flop conversion.	02
5.	To design and realize modulo 10 binary synchronous counter using J-K flip-flops.	02
6.	To design and realize modulo N ripple counter using T flip-flops.	02
7.	To implement universal shift register.	02
8.	To design op-amp based Non-inverting amplifier and Inverting amplifier.	02
9.	To design op-amp based Adder circuit	02
10.	To utilize Vlab for circuit simulation and analysis	02
11.	To utilize Multisim software for circuit simulation and analysis.	02
12.	To design and demonstrate a simulation project.	04