

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	B. Tech.in Electronics and Instrumentation Engineering
Semester:	III
Course Code:	2EI601
Course Title:	Basic Electronics
Course Type:	Core
Year of Introduction:	2023-24

L	T	Practical component				C
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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 (BL3)
3. design the sequential circuits. (BL4)
4. build digital and analog circuits using integrated circuits. (BL6)

Teaching Hours: 30

Unit	Syllabus	Teaching hours
Unit- I	Introduction to Analog & Digital electronics Analog signals, Digital signals, Sampling, Quantization, Binary codes, Combinational circuits.	03
Unit- II	Sequential Logic Circuits Classification of sequential circuits, Flip-flops, triggering of Flip-flops, conversion of flip-flops, Analysis of clocked sequential circuits. State reduction and assignments Flip-flop excitation tables. Design procedure, Design of counters, and design with state equations.	10
Unit- III	State Machines, Shift Registers and Memory Unit Concept of Melay Machine and Moore Machine, Digital design using state machines, Registers, shift registers, ripple counters, synchronous counters, timing sequences, binary cell, construction of memory unit using binary cell	08
Unit- IV	Algorithmic State Machines Components of ASM chart, Features of ASM chart. Examples of ASM chart.	03
Unit- V	Operational Amplifier Fundamentals of operational amplifier, Feedback configurations of operational amplifiers, Op-amp parameters.	06

Laboratory Work:

This shall consist of at least 10 practicals based on the above syllabus.

Suggested Reading:

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 (not restricted to the following):
(Only for Information)**

	Title of Experiment	Hrs.
1.	To implement Binary to Gray code converter.	2
2.	To realize Boolean function using multiplexer	2
3.	To verify characteristic tables of JK, D and T flip-flops	2
4.	To implement Flip-flop conversion.	2
5.	To design and realize modulo 10 binary synchronous counter using J-K flip-flops.	2
6.	To design and realize modulo N ripple counter using T flip-flops.	2
7.	To implement universal shift register.	2
8.	To design op-amp based Non-inverting amplifier and Inverting amplifier.	2
9.	To design op-amp based Adder circuit	2
10.	To utilize Vlab for circuit simulation and analysis	2
11.	To utilize Multisim software for circuit simulation and analysis.	2
12.	To design and demonstrate a simulation project.	4

L = Lecture, T = Tutorial, P = Practical, C = Credit

w.e.f. the academic year 2023 - 24 and onwards