B.P. PODDAR INSTITUTE OF MANAGEMENT AND TECHNOLOGY
Department of Electrical Engineering
Academic Year: 2025-2026 (Even Semester)
LESSON PLAN

Program: Electrical Engineering **Credit: 3** **Contact: 3L**
Paper : Digital Electronics **Paper Code: PC-EE402**

Module	Sl. No.	Topics to be Covered	Text Books / Reference/ Web References	Teaching Pedagogies
Fundamentals of Digital Systems and logic families	L1	Digital signals vs Analog system, Different Logic Gates(AND, OR, NOT, NAND, NOR and Exclusive-OR operations) Boolean algebra, examples of IC gates	T1, R2,W1	a. Lecture b. Chalk c. Green board d. Quiz
	L2	Number systems-binary, signed binary, octal hexadecimal number and Problems Binary arithmetic, one's and two's complements arithmetic, codes	T1, T2, R1,W1	a. Lecture b. Power Point Presentation c. Chalk d. Green Board
	L3	Characteristics of digital lCs,Boolean Expressions and logic diagrams	T2, T3, R2	a. Lecture b. Chalk c. Green board
	L4	Gray code : Design and implement a 4 bit binary to gray code converter	T1, T2, R1, W1	a. Lecture b. Chalk c. Green board
	L5	Error detecting and correcting codes (Parity: Odd and Even Parity)	T1, T2, R1	a. Lecture b. Power Point Presentation c. Chalk
	L6	Digital logic families, Transistor-Transistor Logic (TTL) , Schottky TTL	T2, R1, W1	a. Lecture b. Chalk c. Green board
	L7	CMOS logic, interfacing CMOS and TTL, Tri-state logic. totem pole circuit	T2, R1, W1	a. Lecture b. Chalk c. Green board
Combinational Digital Circuits	L8	Question Answer Session on Number systems	T1,R1,W8	a. Lecture b. Chalk c. Green board
	L9	2 variable, 3 variable and 4 variable K maps, Don't care conditions	T2,W2	a. Lecture b. Chalk c. Green board
	L10	Adders: Half addrer and Full adder using NOR logic Subtractors: Half Subtractor	T2,R2,W2	a. Lecture b. Chalk c. Green board

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	L11	Full Subtractor using AOI logic BCD arithmetic, carry look ahead adder, digital comparator	T1, T2, R1,W2	a. Lecture b. Chalk c. Green board
	L12	Encoders, Decoders Seven Segment decoder	T2, R2	a. Lecture b. Chalk c. Green board
	L13	The Quine-McCluskey (QM) method: Definition and use of QM method to get minimal expression of Boolean function	T1,T2, R1	a. Lecture b. Power Point Presentation c. Chalk
	L14	Multiplexer, De-Multiplexer: Definition of Mux and Dmux, basic 2 bit MUX, 16 input MUX from 2 8 input MUX .	T1,R1,W2	a. Lecture b. Chalk c. Green board
Sequential circuits and systems	L15	Difference between combinational and sequential flip flop. definition of flip flop ,A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop	T1,R1,W6	a. Lecture b. Chalk c. Green board
	L16	J- K- flip flop, Race around condition , Master Slave Flip flop	T2,R2,W1	a. Lecture b. Chalk c. Green board
	L17	T and D types flipflops, applications of flipflops, conversion of Flip flop	T1,T2	a. Lecture b. Chalk c. Green board
	L18	Application of flip flop: shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter	T2,R2	a. Lecture b. Power Point Presentation c. Chalk d. Green board e. Projector
	L19	Counter: Design of MOD 10 Asynchronous counter ripple(Asynchronous) counters, synchronous counters	T2, T3, R2, W3	a. Lecture b. Power Point Presentation
	L20	Counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counter	T2, T3, R2, W3, W7	a. Lecture b. Chalk c. Green Board
	L21	State table & State transition diagram, Sequential circuit design methodology	T2, T3, R2	a. Lecture b. Chalk c. Green Board
A/D and D/A Converters	L22	Different types of A/D (Analog-to-digital converters), single ramp,	T2,R2	a. Lecture b. Chalk, c. Green board

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	L23	Dual slope ramp type	T1,R1	a. Lecture b. Power Point Presentation c. Projector
	L24	Successive-approximation type A/D D/A(Digital-to-analog conversion techniques),	T3,R3,W4	a. Lecture b. Chalk c. Green Board
	L25	R-2R ladder type	T1,R1	a. Lecture b. Chalk c. Green board
	L26	Weighted resistor type D/A	T1, T2, R1	a. Lecture b. Power Point Presentation
	L27	Problems on A/D and D/A converter	T1,R1	a. Lecture b. Chalk c. Green board
	L28	**Solution** of Problems from semester questions.	T2,R2,W4	a. Lecture b. Chalk c. Green board
Semiconductor memories and Programmable logic devices	L29	Comparison of logic families, Two-input TTL NAND Gate, Totem-pole output, TTL Loading and Fan-out	T2, R1	a. Lecture b. Power Point Presentation c. Chalk
	L30	ECL OR/NOR gate, ECL subfamilies	T2, R1	a. Lecture b. Power Point Presentation c. Chalk
	L31	MOS logic, NMOS inverter, NMOS NOR gate	T2, R1	a. Lecture b. Power Point c. Projector
	L32	CMOS inverter, CMOS NAND gate, CMOS NOR gate	T2,R2,W5	a. Lecture b. Chalk, board
	L33	Problems on Adder , Subtractor	T1,R1	a. Lecture b. Chalk c. Green board
	L34	Problems on Counter	T2,R2	a. Lecture b. Chalk c. Green board

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	***L35**	Charge de coupled device memory(CCD),complex Programmable logic devices(CPLDS), Field Programmable Gate Array(FPGA) will be added which are beyond syllabus.	T2,R2	a. Lecture b. Chalk c. Green board

*** Gap within Syllabus**

Total No. of Classes 35

N.B. Lecture notes and PPTs are uploaded in the Moodle of Institute in EE section
http://moodlebppimt.ddns.net/course/view.php?id=3990

PPT drive link https://drive.google.com/drive/u/1/folders/1xH5Sjdjwm5MXlq5gFRa_oK87sh4dO0zd

Text Books:

T1. Digital Principles & Application, 5th Edition, Leach & Malvino, Mc Graw Hill Company.
T2. Modern Digital Electronics, 2nd Edition, R.P. Jain. Tata Mc Graw Hill Company Limited
T3. Fundamental of Digital Circuits, A. Anand Kumar, PHI.

Reference Books:

R1. Digital Logic Design, Morries Mano, PHI.
R2. Digital Integrated Electronics, H. Taub & D. Shilling, Mc Graw Hill Company.
R3. Digital Electronics, James W. Bignell & Robert Donovan, Thomson Delman Learning.
R4. Fundamental of logic Design, Charles H. Roth, Thomson Delman Learning.

Web References:

NPTEL video link

W1: NPTEL IIT Kharagpur on Logic gates
https://www.youtube.com/watch?v=9kBog5wYVKM

W2: Introduction to Combinational Circuit and assymetric gates:
https://www.youtube.com/watch?v=w2EMtgY4nag

W3: Sequential Circuits: https://www.youtube.com/watch?v=HZHag7I-hBg

W4: Lecture 69: ADC and DAC – I:
https://www.youtube.com/watch?v=6PhVUTRx3JA&t=517s

W5: Lecture 3 - Programmable Logic Devices:
https://www.youtube.com/watch?v=PkFX7NjgEdA&t=176s

Some offline class links (YouTube links) of Course Coordinator (Dr. Sutapa Mukherjee)

W6. Sequential circuits and systems: https://www.youtube.com/watch?v=yln_TaQdGPo

W7. Flip Class on 2-Bit Asynchronous / Ripple Up & Down Counter: https://www.youtube.com/watch?v=mBL4vx5dv0E&t=69s

W8. Minimization of SOP and POS expressions using Karnaugh map: https://www.youtube.com/watch?v=h_T98ciKfcQ

Assessment Methodologies:
- Presentation
- Report writing
- Tests
- Assignment
- University examination

Innovations in Teaching/Learning/Assessment Processes:
- E-Learning material, demonstrations, field visits are extensively used.
- Incentive based class room interaction.
- Need based online sessions beyond class hours.
- Assessment process promotes self-learning, written and oral communication skills.

Sutapa Mukherjee

(Dr. Sutapa Mukherjee)
Course Coordinator