

LESSON PLAN (Winter-2025)

Discipline: ETC	Semester: 3rd	Name of the Teaching Faculty: P.BHAWANI
Subject: TH:1- ELECTRIC CIRCUITS & NETWORKS	No of Days / per week class allotted: 3	Semester From date: 14.07.2025 To 15.11.2025 No of Weeks:15
Week	Class Day	Theory Topics
1st	1st	Unit-1: Network Theorems in DC Circuits(5) 1.1 Node Analysis of Electrical Circuits with simple problem.
	2nd	1.1 Mesh Analysis of Electrical Circuits with simple problem.
	3rd	1.2 Explanation & applications of Superposition Theorem, Thevenin's Theorem, Norton's Theorem
2nd	1st	1.2 Explanation & applications of Reciprocity Theorem,
	2nd	1.3 Simple numerical problems on above.
	3rd	Unit-2: A. C. Fundamentals & Sinusoidal Steady State Analysis (8) 2.1 Definitions & explanation of Active & Passive elements.
3rd	1st	2.2 Concept of complex impedance, Rectangular & polar form. Simple problems.
	2nd	2.3 Idea on Apparent, real, and active power.
	3rd	2.4 Sinusoidal response of a series R-L, R-C circuit
4th	1st	2.4 Sinusoidal response of a series R-L-C circuit
	2nd	2.5 Sinusoidal response of a parallel R-L circuit
	3rd	2.5 Sinusoidal response of a parallel R-C circuit
5th	1st	2.5 Sinusoidal response of a parallel R-L-C circuit
	2nd	Unit-3: Resonance (8) 3.1 Introduction to resonance circuits & Resonance tuned circuit
	3rd	3.2 Series resonance
6th	1st	3.2 Parallel resonance
	2nd	3.3 Expression for series resonance, Condition for Resonance, Frequency of Resonance, Impedance, Current, Voltage, power, Q Factor and Power Factor of Resonance, Bandwidth in term of Q. Voltage Magnification, Acceptor Circuit.
	3rd	3.4 Parallel Resonance Condition for Resonance, Frequency of Resonance, Impedance, Current, Voltage, power, Q Factor and Power Factor of Resonance, Bandwidth of resonant circuit / Tank circuit Current magnification, Rejector Circuit,
7th	1st	3.5 Comparisons of Series & Parallel resonance & applications
	2nd	3.6 Simple problems on above Circuits
	3rd	3.6 Simple problems on above Circuits
8th	1st	Unit-4: Passive Filter(8) 4.1 Idea of Passive & Active Filter, Their relative advantages and disadvantages
	2nd	4.2 Idea of Fourier Series & frequency spectrum. (concept only)
	3rd	4.3 Construction, Principle of operation, Characteristics of Low pass, High pass filter.
9th	1st	4.3 Construction, Principle of operation, Characteristics of Band pass & Band stop filter.

	2nd	4.4 Design of Low pass filter.
	3rd	4.4 Design of High pass filter.
10th	1st	4.5 Numerical problems on the above
	2nd	4.5 Numerical problems on the above, 4.6 Composite filter (concept only).
	3rd	Unit-5: Laplace transform and its applications(7) 5.1 Definition & properties of Laplace Transform (LT)
11th	1st	5.2 LT of unit step, impulse, ramp, exponential, sine, cosine, pulse, impulse, Dirac delta function.
	2nd	5.3 Explanation of Laplace Transform theorems like Differential, integral, Time displacement, initial value & final value
	3rd	5.3 Explanation of Laplace Transform theorems like Differential, integral, Time displacement, initial value & final value
12th	1st	5.4 Inverse Laplace Transformation. Simple problem
	2nd	5.4 Inverse Laplace Transformation. Simple problem
	3rd	5.5 Application of Laplace transformation in circuit theory
13th	1st	Unit-6: Two Port Network(9) 6.1 Idea on Linear & Non linear networks, Unilateral & Bilateral networks
	2nd	6.2 Explanation of Z parameter (Open Circuit Impedance Parameter)
	3rd	6.3 Explanation of Y parameter (Short Circuit Admittance Parameter)
14th	1st	6.4 Explanation of h -parameter (Hybrid Parameter)
	2nd	6.5 Interrelation of above parameters
	3rd	6.5 Interrelation of above parameters
15th	1st	6.5 Inter Connection of Two Port Network
	2nd	6.4 Simple problem on above parameters.
	3rd	6.4 Simple problem on above parameters.



Signature of the Faculty

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Discipline: ETC	Semester: 3rd	Name of the Teaching Faculty: P.BHAWANI
Subject: TH:3- DIGITAL ELECTRONICS	No of Days / per week class allotted: 3	Semester From date: 14.07.2025 To 15.11.2025 No of Weeks:15
Week	Class Day	Theory Topics
1st	1st	Unit-1: Logic Gates (4) 1.1 Basic logic gates: OR, AND, and NOT 1.1.1 Truth tables 1.1.2 Logic symbols 1.1.3 Logic voltage levels 1.1.4 Logic circuit design examples
	2nd	1.2 Integrated Circuits 1.3 NOR, NAND, Exclusive OR, and Exclusive NOR gates.
	3rd	1.4 NOR and NAND gates used as inverters. 1.5 Fan-in and fan-out
2nd	1st	1.6 Termination of unused inputs 1.7 AND and OR gates constructed from NAND and NOR gates
	2nd	Unit-2: Boolean Algebra (5) 2.1 Boolean operations (OR, AND, NOT) 2.2 Representation of logic circuits by Boolean expressions. 2.3 Laws of Boolean algebra: 2.3.1 Double inversion: $A''=A$ 2.3.2 OR identities: $A+0=A$, $A+1=1$, $A+A=A$, $A+A'=1$ 2.3.3 AND identities: $A.0=0$, $A.1=A$, $A.A=A$, $A.A'=0$ 2.3.4 Cumulative laws: $A+B=B+A$, $A.B=B.A$ 2.3.5 Associative laws: $(A+B)+C=A+(B+C)$, $(A.B).C=A.(B.C)$ 2.3.6 Distributive laws: $A+(B.C)=(A+B).(A+C)$, $A.(B+C)=A.B+A.C$ 2.3.7 DeMorgan's theorems $(A+B+C+...)'=A'.B'.C'...$, $(A.B.C...)'=A'+B'+C'...$ 2.3.8 Applications to logic circuit simplifications and design
	3rd	2.4 Equivalent logic gates 2.5 NAND and NOR implementations of logic circuits.
3rd	1st	2.6 Standard forms of Boolean expressions 2.6.1 Sum-of-products (SOP) 2.6.2 Product-of-sums (POS)
	2nd	2.7 Karnaugh mapping
	3rd	2.7 Karnaugh mapping
4th	1st	Unit-3: Combinational Logic Circuits (6) 3.1 Half adder 3.2 Full adder
	2nd	3.3 Half Subtractor 3.4 Full Subtractor
	3rd	3.5 4 bit adder. 3.6 Multiplexer (4:1)
5th	1st	3.7 De- multiplexer (1:4) 3.8 Decoder
	2nd	3.9 Encoder 3.10 Digital comparator (3 Bit)
	3rd	3.11 Seven segment Decoder

6th	1st	Unit-4: Latches & Flip-Flops(6) 4.1. Basic latches 4.1.1 NOR latch 4.1.2 NAND latch 4.1.3 Example uses of latches
	2nd	4.2. Gated latches 4.2.1 Gated S-R latch, 4.2.2 Gated D-latch
	3rd	4.3. Flip-flops: 4.3.2 S-R flip-flop 4.3.3 D-type flip-flop
7th	1st	4.3.4 J-K flip-flop 4.3.5 T-type flip-flop
	2nd	4.3.1 Master-slave and edge-triggered principles
	3rd	4.3.6 Flip-flop timing diagrams
8th	1st	Unit-5: Counters (7) 5.1 Circuit diagram and working principle of Binary counters
	2nd	5.2 up-down counter (circuits, truth tables, and timing diagrams)
	3rd	5.3 Asynchronous counters and ripple counter
9th	1st	5.4 Synchronous counters 5.5 Decade counter
	2nd	5.6 Module–n counter and its combinations 5.7. Divide-by-n counters obtained from truncated binary sequences
	3rd	5.8. Synchronous counter design using D-type flip-flops
10th	1st	5.9 Synchronous counter design using J-K flip-flops
	2nd	Unit-6: Shift Registers (5) 6.1 Circuit diagram, truth tables, and timing diagrams of Shift Registers
	3rd	6.2 Serial input shift register
11th	1st	6.3 Serial/parallel load shift register
	2nd	6.4 Shift register counters 6.4.1. Ring counter
	3rd	6.4.2. Self-starting ring counter 6.4.3. Johnson counter
12th	1st	Unit-7: Semiconductor Memories(7) 7.1 Define the terms ROM, RAM, PROM, EPROM. 7.2 Draw a typical memory cell
	2nd	7.3 Design a small diode matrix ROM to serve as a code converter.
	3rd	7.3 Design a small diode matrix ROM to serve as a code converter.
13th	1st	7.4 Design and draw the logic diagram of a specified size memory system
	2nd	7.4 Design and draw the logic diagram of a specified size memory system
	3rd	7.5 Operating principle of dynamic memory
14th	1st	7.6 Advantages and disadvantages of dynamic memory vs. static memory 7.7 Difference between dynamic memory vs. static memory
	2nd	Unit-8: Sequential Circuit Design(5) 8.1 Combinational vs. Sequential circuits
	3rd	8.2 Adder, Subtractor
15th	1st	decoder, multiplexer
	2nd	de-multiplexer, comparator
	3rd	8.3. Finite state machines- Concept only


 Signature of the Faculty

LESSON PLAN (Winter-2025)

Discipline:ETC	Semester: 5th	Name of the Teaching Faculty: P BHAWANI
Subject:TH.5 POWER ELECTRONICS AND PLC	No of Days /per week class allotted: 4	Semester From date: 14.07.2025 To 15.11.2025 No of Weeks:15
Week	Class Day	Theory Topics
1st	1st	UNIT-1:UNDERSTAND THE CONSTRUCTION AND WORKING OF POWER ELECTRONIC DEVICES (18) 1.1 Construction, Operation, V-I characteristics & application of power diode
	2nd	Construction, Operation, V-I characteristics & application of Power SCR
	3rd	Construction, Operation, V-I characteristics & application of Power DIAC
	4th	Construction, Operation, V-I characteristics & application of Power TRIAC
2nd	1st	Construction, Operation, V-I characteristics & application of Power MOSFET
	2nd	Construction, Operation, V-I characteristics & application of GTO & IGBT
	3rd	1.2 Two transistor analogy of SCR.
	4th	1.3 Gate characteristics of SCR.
3rd	1st	1.4 Switching characteristic of SCR during turn on and turn off.
	2nd	1.5 Turn on methods of SCR.
	3rd	1.6 Turn off methods of SCR (Line commutation and Forced commutation) 1.6.1 Load Commutation
	4th	1.6.2 Resonant pulse commutation
4th	1st	1.7 Voltage and Current ratings of SCR.
	2nd	1.8 Protection of SCR 1.8.1 Over voltage protection 1.8.2 Over current protection 1.8.3 Gate protection
	3rd	1.9 Firing Circuits 1.9.1 General layout diagram of firing circuit 1.9.2 R firing circuits
	4th	1.9.3 R-C firing circuit 1.9.4 UJT pulse trigger circuit
5th	1st	1.9.4 UJT pulse trigger circuit 1.9.5 Synchronous triggering (Ramp Triggering)
	2nd	1.10 Design of Snubber Circuits
	3rd	UNIT-2: UNDERSTAND THE WORKING OF CONVERTERS, AC REGULATORS AND CHOPPERS(12) 2.1 Controlled rectifiers Techniques(Phase Angle, Extinction Angle control), Single quadrant semi converter, two quadrant full converter and dual Converter
	4th	2.2 Working of single-phase half wave controlled converter with Resistive load.
6th	1st	2.2 Working of single-phase half wave controlled converter with R-L loads, 2.3 Understand need of freewheeling diode.
	2nd	2.4 Working of single phase fully controlled converter with resistive load.
	3rd	2.4 Working of single phase fully controlled converter with R- L load.

	4th	2.5 Working of three-phase half wave controlled converter with Resistive load
7th	1st	2.6 Working of three phase fully controlled converter with resistive load.
	2nd	2.7 Working of single phase AC regulator.
	3rd	2.8 Working principle of step up chopper.
	4th	2.8 Working principle of step down chopper.
8th	1st	2.9 Control modes of chopper
	2nd	2.10 Operation of chopper in all four quadrants.
	3rd	UNIT-3: UNDERSTAND THE INVERTERS AND CYCLO-CONVERTERS(8) 3.1 Classify inverters. 3.2 Explain the working of series inverter.
	4th	3.2 Explain the working of series inverter.
9th	1st	3.3 Explain the working of parallel inverter
	2nd	3.4 Explain the working of single-phase bridge inverter.
	3rd	3.5 Explain the basic principle of Cyclo-converter.
	4th	3.6 Explain the working of single-phase step up Cyclo-converter.
10th	1st	3.6 Explain the working of single-phase step down Cyclo-converter.
	2nd	3.7 Applications of Cyclo-converter.
	3rd	UNIT-4: UNDERSTAND APPLICATIONS OF POWER ELECTRONIC CIRCUITS(10) 4.1 List applications of power electronic circuits. 4.2 List the factors affecting the speed of DC Motors.
	4th	4.3 Speed control for DC Shunt motor using converter.
11th	1st	4.4 Speed control for DC Shunt motor using chopper.
	2nd	4.5 List the factors affecting speed of the AC Motors.
	3rd	4.6 Speed control of Induction Motor by using AC voltage regulator.
	4th	4.7 Speed control of induction motor by using converters and inverters (V/F control).
12th	1st	4.8 Working of UPS with block diagram.
	2nd	4.9 Battery charger circuit using SCR with the help of a diagram.
	3rd	4.10 Basic Switched mode power supply (SMPS) - explain its working & applications
	4th	4.10 Basic Switched mode power supply (SMPS) - explain its working & applications
13th	1st	UNIT-5: PLC AND ITS APPLICATIONS(12) 5.1 Introduction of Programmable Logic Controller(PLC) 5.2 Advantages of PLC
	2nd	5.3 Different parts of PLC by drawing the Block diagram and purpose of each part of PLC. 5.4 Applications of PLC
	3rd	5.5 Ladder diagram
	4th	5.6 Description of contacts and coils in the following states i) Normally open ii) Normally closed iii) Energized output iv) latched Output v) branching
14th	1st	5.7 Ladder diagrams for i) AND gate ii) OR gate and iii) NOT gate.
	2nd	5.8 Ladder diagrams for combination circuits using NAND, NOR, AND, OR and NOT

14th	3rd	5.9 Timers-i) T ON ii) T OFF and iii) Retentive timer, 5.10 Counters-CTU, CTD
	4th	5.11 Ladder diagrams using Timers and counters
15th	1st	5.12 PLC Instruction set
	2nd	5.13 Ladder diagrams for following (i) DOL starter and STAR-DELTA starter (ii) Stair case lighting (iii) Traffic light Control (iv) Temperature Controller
	3rd	5.14 Special control systems- Basics DCS & SCADA systems
	4th	5.15 Computer Control–Data Acquisition, Direct Digital Control System (Basics only)

Signature of the faculty