

ACADEMIC LESSON PLAN OF WINTER 2025

Discipline: ELECTRICAL	Semester: 3 rd Sem	Name of the Teaching Faculty: SUNITA ORAM
Subject: DC Machines and Transformers	No. of days/per week class allotted: 3P/w week	Semester from: 14 th July 2025 to 15 th Nov 2025 No. of Weeks: 15 weeks
Week	Class Day	Theory Topics
1 st	1 st	DC Generators 1.1 D.C. generator: construction, parts, materials and their functions (Contd...)
	2 nd	1.1 D.C. generator: construction, parts, materials and their functions
	3 rd	1.2 Principle of operation of DC generator 1.2.1 Fleming's right hand rule
2 nd	1 st	1.2.2 Derive the emf equation of DC Generator
	2 nd	1.2.3 Schematic diagrams of different types of DC generator
	3 rd	1.2.4 Armature reaction (Contd...)
3 rd	1 st	1.2.4 Armature reaction
	2 nd	1.2.5 Commutation (Contd...)
	3 rd	1.2.5 Commutation 1.2.6 Applications of D.C. generators
4 th	1 st	D.C. Motors 2.1 D.C. motor: Types of DC motors
	2 nd	2.1.1 Fleming's left hand rule 2.1.2 Principle of operation of Back e.m.f. and its significance
	3 rd	2.1.3 Voltage equation of DC motor
5 th	1 st	2.1.4 Torque and Speed; Armature torque, Shaft torque, BHP, Brake test, losses, efficiency (Contd...)
	2 nd	2.1.4 Torque and Speed; Armature torque, Shaft torque, BHP, Brake test, losses, efficiency
	3 rd	2.2 DC motor starters: Necessity, two point and three point starters
6 th	1 st	2.3 Speed control of DC shunt and series motor: Flux and Armature control (Contd)
	2 nd	2.3 Speed control of DC shunt and series motor: Flux and Armature control
	3 rd	2.4 Brushless DC Motor: Construction and working
7 th	1 st	Single Phase Transformers 3.1 Types of transformers: Shell type and core type
	2 nd	3.2 Construction: Parts and functions 3.3 Materials used for different parts: CRGO, CRNGO, HRGO, amorphous cores
	3 rd	3.4 Transformer: Principle of operation
8 th	1 st	3.5 EMF equation of transformer: Derivation, Voltage transformation ratio
	2 nd	3.5 EMF equation of transformer: Derivation, Voltage transformation ratio (Contd)
	3 rd	3.6 Significance of transformer ratings 3.7 Transformer No-load and on-load phasor diagram, Leakage reactance (Contd..)
9 th	1 st	3.7 Transformer No-load and on-load phasor diagram, Leakage reactance
	2 nd	3.8 Equivalent circuit of transformer: Equivalent resistance and reactance
	3 rd	3.9 Voltage regulation and Efficiency: Direct loading, OC/SC method, All day efficiency (Contd...)
10 th	1 st	3.9 Voltage regulation and Efficiency: Direct loading, OC/SC method, All day

		efficiency
	2 nd	Three Phase Transformers 4.1 Bank of three single phase transformers,(Y-Y,Δ-Δ ,Δ-Y, Y- Δ) (Contd...)
	3 rd	4.1 Bank of three single phase transformers,(Y-Y,Δ-Δ ,Δ-Y, Y- Δ)
11 th	1 st	4.2 Single unit of three phase transformer
	2 nd	4.3 Distribution and Power transformers: Construction and cooling,
	3 rd	4.4 Criteria for selection of distribution transformer, and power transformer.
12 th	1 st	4.5 Need of parallel operation of three phase transformer
	2 nd	4.6 Conditions for parallel operation.
	3 rd	4.7 Polarity tests on mutually inductive coils and single phase transformers
13 th	1 st	4.8 Polarity test, Phasing out test on Three-phase transformer
	2 nd	Special Purpose Transformers 5.1 Single phase and three phase autotransformers: Construction, working and applications. 5.2 Isolation transformer: Constructional Features and applications
	3 rd	Special Purpose Transformers 5.1 Single phase and three phase autotransformers: Construction, working and applications.(Contd...)
14 th	1 st	5.1 Single phase and three phase autotransformers: Construction, working and applications. (Contd...)
	2 nd	5.1 Single phase and three phase autotransformers: Construction, working and applications. (Contd...)
	3 rd	5.1 Single phase and three phase autotransformers: Construction, working and applications.
15 th	1 st	5.2 Isolation transformer: Constructional Features and applications (Contd...)
	2 nd	5.2 Isolation transformer: Constructional Features and application(Contd...)
	3 rd	5.2 Isolation transformer: Constructional Features and applications

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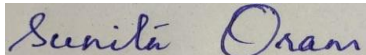
Discipline: ELECTRICAL	Semester: 5 TH Sem	Name of the Teaching Faculty: SUNITA ORAM
Subject: ENERGY CONVERSION– II	No. of days/per week class allotted: 4p/week	Semester from: 14 th July 2025 to 15 th Nov 2025 No. of Weeks: 15 weeks
1 st	1 st	Unit-1: ALTERNATOR 1.1 Types of alternator and their constructional features
	2 nd	1.2 Basic working principle of alternator and establish the relation between speed and frequency
	3 rd	1.3 Explain terminology in armature winding, and derive expressions for winding factors (Pitch factor, Distribution factor).
	4 th	1.4 Explain harmonics, its causes and impact on winding factor.
2 nd	1 st	1.5 Derive E.M.F equation. (Solve numerical problems (contd.))
	2 nd	1.5 Derive E.M.F equation. (Solve numerical problems
	3 rd	1.6 Explain Armature reaction and its effect on emf at different pf of load (contd.)
	4 th	1.6 Explain Armature reaction and its effect on emf at different pf of load.
3 rd	1 st	1.7 Draw the vector diagram of loaded alternator. (Solve numerical problems)
	2 nd	1.8 State and explain testing of alternator (open circuit and short circuit methods) (Solve numerical problems).(contd.)
	3 rd	1.8 State and explain testing of alternator (open circuit and short circuit methods) (Solve numerical problems).
	4 th	1.9 Determination of voltage regulation of Alternator by direct loading and synchronous impedance method
4 th	1 st	1.10 Explain parallel operation of alternator using synchro-scope, dark and bright lamp method
	2 nd	1.11 Explain distribution of load by parallel connected alternators
	3 rd	Unit-2: SYNCHRONOUS MOTOR 2.1 Explain constructional feature of Synchronous Motor.
	4 th	2.2 Explain principles of operation, concept of load angle. 2.3 Explain effect of varying load with constant excitation(contd.)
5 th	1 st	2.3 Explain effect of varying load with constant excitation
	2 nd	2.4 Explain effect of varying excitation with constant load.
	3 rd	2.5 Derive torque, power developed(contd.)
	4 th	2.5 Derive torque, power developed. 2.6 Explain power angle characteristics of cylindrical rotor motor.
6 th	1 st	2.7 Explain effect of excitation on Armature current and power factor. 2.8 Explain Hunting & function of Damper Bars.
	2 nd	2.9 Describe method of starting of Synchronous motor.(contd.)
	3 rd	2.9 Describe method of starting of Synchronous motor.
	4 th	2.10 State application of synchronous motor Unit-3: THREE PHASE INDUCTION MOTOR
7 th	1 st	3. 1 Explain and derive production of rotating magnetic field.
	2 nd	3. 2 Explain constructional feature of Squirrel cage and Slip ring induction motor.
	3 rd	3. 3 Explain principles of operation of 3-phase Induction motor.
	4 th	3. 4 Explain slip speed, slip and slip relation with rotor quantities 3. 5 Derive Torque during starting and running and conditions for maximum torque. (solve numerical problems) (contd.)
8 th	1 st	3. 5 Derive Torque during starting and running and conditions for maximum torque. (solve numerical problems)

	2 nd	3. 6 Derive Torque-slip characteristics
	3 rd	3. 7 Derive relation between full load torque and starting torque etc. (solve numerical problems).
	4 th	3. 8 Determine the relations between Rotor Copper loss, Rotor output and Gross Torque, and relationship of slip with rotor copper loss. (solve numerical problems)
9 th	1 st	3. 9 Explain and state Methods of starting and different types of starters
	2 nd	3. 10 Explain speed control by Voltage Control, Rotor resistance control, pole changing, frequency control methods.
	3 rd	3. 11 Describe plugging applicable to three phase induction motor
	4 th	3. 12 Describe different types of motor enclosures
10 th	1 st	3. 13 Explain principle of Induction Generator and state its applications
	2 nd	Unit-4: SINGLE PHASE INDUCTION MOTOR. 4.1 Explain Rotating – field theory of 1-phase induction motor.
	3 rd	4.2 Explain Ferrari's principle.
	4 th	4.3 Explain Working principle, Torque speed characteristics, performance characteristics and application of following single phase motors 4.3.1 Split phase motor.
11 th	1 st	4.3.2 Capacitor Start motor.
	2 nd	4.3.3 Capacitor start, capacitor run motor
	3 rd	4.3.4 Permanent capacitor type motor
	4 th	4.3.5 Shaded pole motor
12 th	1 st	4.4 Explain the method to change the direction of rotation of above motors
	2 nd	Unit-5: COMMUTATOR MOTORS 5.1 Explain construction, working principle, running characteristic and application of single phase series motor (contd.)
	3 rd	5.1 Explain construction, working principle, running characteristic and application of single phase series motor.
	4 th	5.2 Explain construction, working principle and application of Universal motors. (contd.)
13 th	1 st	5.2 Explain construction, working principle and application of Universal motors.
	2 nd	5.3 Explain working principle of Repulsion start Motor, Repulsion start Induction run motor, Repulsion Induction motor.(contd.)
	3 rd	5.3 Explain working principle of Repulsion start Motor, Repulsion start Induction run motor, Repulsion Induction motor.
	4 th	Unit-6: SPECIAL ELECTRICAL MACHINE 6.1 Principle of Stepper motor.
14 th	1 st	6.2 Classification of Stepper motor. 6.3 Principle of variable reluctance stepper motor.
	2 nd	6.4 Principle of Permanent magnet stepper motor.
	3 rd	6.5 Principle of hybrid stepper motor.
	4 th	6.6 Applications of Stepper motor.
15 th	1 st	Unit-7: THREE PHASE TRANSFORMERS 7.1 Explain Grouping of winding, Advantages
	2 nd	7.2 Explain parallel operation of the three phase transformers.
	3 rd	7.3 Explain tap changer (On/Off load tap changing
	4 th	7.4 State maintenance of Transformers

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Discipline: ELECTRICAL	Semester: 5 TH Sem (Sec- A)	Name of the Teaching Faculty: Sunita Oram and Biswanita Sahu
Subject: ELECTRICAL Machine Lab – II	No. of days/per week class allotted: 2p(6hr)/week	Semester from: 14 th July 2025 to 15 th Nov 2025 No. of Weeks: 15 weeks
1 st	1 st	Study of Direct on Line starter, Star-Delta starter, connection and running a 3-phase Induction motor and measurement of starting current (cont..)
	2 nd	Study of Direct on Line starter, Star-Delta starter, connection and running a 3-phase Induction motor and measurement of starting current
2 nd	1 st	Study of Auto transformer starter and rotor resistance starter connection and running a 3-phase induction motor and measurement of starting current(cont..)
	2 nd	Study of Auto transformer starter and rotor resistance starter connection and running a 3-phase induction motor and measurement of starting current
3 rd	1 st	Study and Practice of connection & Reverse the direction of rotation of Three Phase Induction motor(cont..)
	2 nd	Study and Practice of connection & Reverse the direction of rotation of Three Phase Induction motor
4 th	1 st	Study and Practice of connection & Reverse the direction of rotation of Single Phase Induction motor. (cont..)
	2 nd	Study and Practice of connection & Reverse the direction of rotation of Single Phase Induction motor.
5 th	1 st	Heat run test of 3-phase transformer(cont..)
	2 nd	Heat run test of 3-phase transformer
6 th	1 st	OC and SC test of alternator and determination of regulation by synchronous impedance method. (cont..)
	2 nd	OC and SC test of alternator and determination of regulation by synchronous impedance method.
7 th	1 st	Determination of regulation of alternator by direct loading (cont..)
	2 nd	Determination of regulation of alternator by direct loading
8 th	1 st	Parallel operation of two alternators and study load sharing(cont..)
	2 nd	Parallel operation of two alternators and study load sharing
9 th	1 st	Measurement of power of a 3-phase Load using two wattmeter method and verification of the result using one 3-phase wattmeter(cont..)
	2 nd	Measurement of power of a 3-phase Load using two wattmeter method and verification of the result using one 3-phase wattmeter
10 th	1 st	Connection of 3-phase energy meter to a 3-phase load (cont..)
	2 nd	Connection of 3-phase energy meter to a 3-phase load
11 th	1 st	Study of an O.C.B. (cont..)
	2 nd	Study of an O.C.B.
12 th	1 st	Study of induction type over current / reverse power relay (cont..)
	2 nd	Study of induction type over current / reverse power relay
13 th	1 st	Study of Buchholz's relay(cont..).
	2 nd	Study of Buchholz's relay.
14 th	1 st	Study of an earth fault relay (cont..)
	2 nd	Study of an earth fault relay
15 th	1 st	Dismantling of a single phase capacitor motor and study its winding connection (cont..)
	2 nd	EXP-15. Dismantling of a single phase capacitor motor and study its winding connection



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Discipline: Electrical	Semester: 5 TH (SEC B)	Name of the Teaching Faculty: SUNITA ORAM
Subject: DEMP	No. of days/per week class allotted: 5p/week	Semester from: 14.07.2025 to 15.11.2025 No. of weeks: 15 weeks
Week	Class/week	Theory Topics
1 st	1 st	BASICS OF DIGITAL ELECTRONICS 1.1 Binary, Octal, Hexadecimal number systems and compare with Decimal system.
	2 nd	1.2 Binary addition, subtraction, Multiplication and Division.
	3 rd	1.3 1's complement and 2's complement numbers for a binary number
	4 th	1.4 Subtraction of binary numbers in 2's complement method.
	5 th	1.5 Use of weighted and Un-weighted codes & write Binary equivalent number for a number in 8421, Excess-3 and Gray Code and vice-versa.
2 nd	1 st	1.6 Importance of parity Bit.
	2 nd	1.7 Logic Gates: AND, OR, NOT, NAND, NOR and EX-OR gates with truth table.
	3 rd	1.8 Realize AND, OR, NOT operations using NAND, NOR gates.
	4 th	1.9 Different postulates and De-Morgan's theorems in Boolean algebra
	5 th	1.10 Use Of Boolean Algebra For Simplification Of Logic Expression
3 rd	1 st	1.11 Karnaugh Map For 2,3,4 Variable, Simplification Of SOP And POS Logic Expression Using K-Map.
	2 nd	1.11 Karnaugh Map For 2,3,4 Variable, Simplification Of SOP And POS Logic Expression Using K-Map.
	3 rd	1.11 Karnaugh Map For 2,3,4 Variable, Simplification Of SOP And POS Logic Expression Using K-Map.
	4 th	1.11 Karnaugh Map For 2,3,4 Variable, Simplification Of SOP And POS Logic Expression Using K-Map.
	5 th	1.11 Karnaugh Map For 2,3,4 Variable, Simplification Of SOP And POS Logic Expression Using K-Map.
4 th	1 st	2. COMBINATIONAL LOGIC CIRCUITS 2.1 Give the concept of combinational logic circuits
	2 nd	2.1 Give the concept of combinational logic circuits
	3 rd	2.2 Half adder circuit and verify its functionality using truth table.
	4 th	2.3 Realize a Half-adder using NAND gates only and NOR gates only.
	5 th	2.3 Realize a Half-adder using NAND gates only and NOR gates only.
5 th	1 st	2.4 Full adder circuit and explain its operation with truth table.

	2 nd	2.4 Full adder circuit and explain its operation with truth table.
	3 rd	2.5 Realize full-adder using two Half-adders and an OR – gate and write truth table
	4 th	2.5 Realize full-adder using two Half-adders and an OR – gate and write truth table
	5 th	2.6 Full subtractor circuit and explain its operation with truth table.
6 th	1 st	2.6 Full subtractor circuit and explain its operation with truth table.
	2 nd	2.7 Operation of 4 X 1 Multiplexers and 1 X 4 demultiplexer.
	3 rd	2.7 Operation of 4 X 1 Multiplexers and 1 X 4 demultiplexer.
	4 th	2.8 Working of Binary-Decimal Encoder & 3 X 8 Decoder
	5 th	2.9 Working of Two bit magnitude comparator
7 th	1 st	3. SEQUENTIAL LOGIC CIRCUITS 3.1 Give the idea of Sequential logic circuits.
	2 nd	3.2 State the necessity of clock and give the concept of level clocking and edge triggering,
	3 rd	3.3 Clocked SR flip flop with preset and clear inputs.
	4 th	3.3 Clocked SR flip flop with preset and clear inputs.
	5 th	3.5 Construct level clocked JK flip flop using S-R flip-flop and explain with truth table
8 th	1 st	3.6 Concept of race around condition and study of master slave JK flip flop.
	2 nd	3.7 Give the truth tables of edge triggered D and T flip flops and draw their symbols.
	3 rd	3.8 Applications of flip flops.
	4 th	3.9 Define modulus of a counter
	5 th	3.10 4-bit asynchronous counter and its timing diagram.
9 th	1 st	3.11 Asynchronous decade counter.
	2 nd	3.12 4-bit synchronous counter.
	3 rd	3.13 Distinguish between synchronous and asynchronous counters.
	4 th	3.14 State the need for a Register and list the four types of registers.
	5 th	3.15 Working of SISO, SIPO, PISO, PIPO Register with truth table using flip flop.
10 th	1 st	4. 8085 MICROPROCESSOR 4.1 Introduction to Microprocessors, Microcomputers
	2 nd	4.1 Introduction to Microprocessors, Microcomputers
	3 rd	4.2 Architecture of Intel 8085A Microprocessor and description of each block.
	4 th	4.2 Architecture of Intel 8085A Microprocessor and description of each block.

	5 th	4.3 Pin diagram and description.
11 th	1 st	4.4 Stack, Stack pointer & stack top
	2 nd	4.5 Interrupts
	3 rd	4.6 Opcode & Operand,.
	4 th	4.7 Differentiate between one byte, two byte & three byte instruction with example
	5 th	4.8 Instruction set of 8085 example
12 th	1 st	4.9 Addressing mode
	2 nd	4.10 Fetch Cycle, Machine Cycle, Instruction Cycle, T-State
	3 rd	4.11 Timing Diagram for memory read, memory write, I/O read, I/O write
	4 th	4.12 Timing Diagram for 8085 instruction
	5 th	4.13 Counter and time delay.
13 th	1 st	4.14 Simple assembly language programming of 8085
	2 nd	4.14 Simple assembly language programming of 8085
	3 rd	4.14 Simple assembly language programming of 8085
	4 th	4.14 Simple assembly language programming of 8085
	5 th	4.14 Simple assembly language programming of 8085
14 th	1 st	5. INTERFACING AND SUPPORT CHIPS 5.1 Basic Interfacing Concepts,
	2 nd	5.1 Basic Interfacing Concepts
	3 rd	5.2 Functional block diagram and description of each block of Programmable peripheral interface Intel 8255
	4 th	5.2 Functional block diagram and description of each block of Programmable peripheral interface Intel 8255
	5 th	5.3 Application using 8255
15 th	1 st	5.3 Application using 8255
	2 nd	Seven segment LED display
	3 rd	Square wave generator
	4 th	Traffic light Controller
	5 th	Traffic light Controller

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