Discipline- Electrical Engg.	Semester-5th	Name of the teaching facualty- SWARNAPRABHA PANIGRAHI
Subject- Ec-II	No of days/week class allotted-5	No of weeks-15 From 14/7/25
Week	Class day	Theory topic
1	1st	**THREE PHASE INDUCTION MOTOR-**Introduction
	2nd	Explain and derive production of rotating magneticfield
	3rd	Explain constructional feature of Squirrel cage and Slip ring induction motors
	4th	Explain principles of operation of 3-phase Inductionmotor
		Explain slip speed, slip and slip relation with rotorquantities
2	1st	Numerical problems
	2nd	Derive Torque during starting conditions for maximum torque. (solve numericalproblems)
	3rd	Derive Torque during running conditions for maximum torque. (solve numericalproblems)
	4th	Numerical problems
		Derive Torque-slipcharacteristics
3	1st	Derive relation between full load torque and starting torque etc. (solve numericalproblems)
	2nd	Numerical problems
	3rd	Determine the relations between Rotor Copper loss, Rotor output and Gross Torque, and relationship of slip with rotor copper loss. (solve numericalproblems)
	4th	Numerical problems
		Explain principle of Induction Generator and state its applications
4	1st	Explain and state Methods of starting and different types of starters.
	2nd	Explain speed control by Voltage Control, Rotor resistance control, pole changing, frequency control methods.
	3rd	Describe plugging applicable to three phase induction motor
	4th	Describe different types of motor enclosures
		Doubt clearance
5	1st	**ALTERNATOR-**
	2nd	Introduction
	3rd	State types of alternator and their constructionalfeatures
	4th	Explain working principle of alternator and establish the relation between speed andfrequency

		Explain terminology in armature winding
6	1st	derive expressions for winding factors (Pitch factor & distribution factor)
	2nd	Solve numerical
	3rd	Explain harmonics, its causes and impact on windingfactor
	4th	DeriveE.M.Fequation.(Solve numericalproblems)
		Solve Numericals
7	1st	Explain Armature reaction and its effect on emf at different pf ofload
	2nd	Draw the vector diagram of loaded alternator. (Solve numericalproblems)
	3rd	Solve Numericals
	4th	State and explain testing of alternator -open circuit Test & Short circuit test
		Solve Numericals
86	1st	Determination of voltage regulation of Alternator by direct loading and synchronous impedancemethod
	2nd	Explain parallel operation of alternator using synchro-scope, dark and bright lampmethod
	3rd	Explain distribution of load by parallel connectedalternators
	4th	**SYNCHRONOUS MOTOR-** Explain constructional feature of SynchronousMotor
		Explain principles of operation, concept of loadangle
9	1st	Explain effect of varying load with constantexcitation Explain effect of varying excitation with constantload
	2nd	Derive torque, powerdeveloped-solve numerical
	3rd	Explain power angle characteristics of cylindrical rotormotor
	4th	Explain effect of excitation on Armature current and powerfactor
		Explain Hunting & function of DamperBars
10	1st	State application of synchronousmotor
	2nd	Describe method of starting of Synchronousmotor
	3rd	Doubt clearance
	4th	**SINGLE PHASE INDUCTION MOTOR-**
		Explain Rotating – field theory of 1-phase inductionmotor
11	1st	Explain Ferrari'sprinciple
	2nd	Explain Working principle, Torque speed characteristics, performance characteristics and application of Split phasemotor

	3rd	Explain Working principle, Torque speed characteristics, performance characteristics and application of Capacitor Startmotor
	4th	Explain Working principle, Torque speed characteristics, performance characteristics and application of Capacitor start, capacitor runmotor
		Explain Working principle, Torque speed characteristics, performance characteristics and application of Permanent capacitor typemotor
12	1st	Explain Working principle, Torque speed characteristics, performance characteristics and application of Shaded polemotor
	2nd	Explain the method to change the direction of rotation of Split phasemotor, Capacitor Startmotor, Capacitor start, capacitor runmotor, Permanent capacitor typemotor & Shaded Pole motor
	3rd	Doubt clearance
	4th	**COMMUTATOR MOTORS- introduction**
		Explain construction of single phase series motor
13	1st	working principle, running characteristic and application of single phase series motor
	2nd	Explain construction, working principle and application of Universal motors
	3rd	Explain working principle of Repulsion start Motor, Repulsion start Induction run motor
	4th	Explain working principle of Repulsion Induction motor
		Brief discussion about all the motors-Doubt clearance
14	1st	Principle of Stepper motor
	2nd	Classification of Stepper motor
	3rd	Principle of variable reluctant stepper motor
	4th	Principle of Permanent magnet stepper motor
		Principle of hybrid stepper motor Applications of Stepper motor
15	1st	**THREE PHASE TRANSFORMERS-**introduction
	2nd	Explain Grouping of winding, Advantages
	3rd	Explain parallel operation of the three phase transformers
	4th	Explain tap changer (On/Off load tap changing)
		State maintenance of Transformers

Discipline- Electrical Engg.	Semester-5th	Name of the teaching facualty- Sidharth Sankar Sahu & SwarnaprabhaPanigrahi
Subject- Electrical Machine Lab-II	No of days/week class allotted-6	No of weeks-15 From 14/7/25
Week	Class day	Practical topic
1	1st	Study of (Manual and Semi automatic) Direct on Line starter, Star-Delta starter, connection and running a 3-phase Induction motor and measurement of starting current
	2nd	Practical observation, conclusion ,record correction
2	1st	Study of (Manual and Semi automatic) Auto transformer starter and rotor resistance starter connection and running a 3-phase induction motor and measurement of starting current
	2nd	Practical observation, conclusion ,record correction
3	1st	Study and Practice of connection & Reverse the direction of rotation of Three Phase Induction motor
	2nd	Practical observation, conclusion ,record correction
4	1st	Study and Practice of connection & Reverse the direction of rotation of Single Phase Induction motor
	2nd	Practical observation, conclusion ,record correction
5	1st	Heat run test of 3-phase transformer
	2nd	Practical observation, conclusion ,record correction
6	1st	OC and SC test of alternator and determination of regulation by synchronous impedance method
	2nd	Practical observation, conclusion ,record correction
7	1st	Determination of regulation of alternator by direct loading
	2nd	Practical observation, conclusion ,record correction
8	1st	Parallel operation of two alternators and study load sharing
	2nd	Practical observation, conclusion ,record correction
9	1st	Measurement of power of a 3-phase Load using two wattmeter method and verification of the result using one 3-phase wattmeter
	2nd	Practical observation, conclusion ,record correction

10	1st	Connection of 3-phase energy meter to a 3-phase load
	2nd	Practical observation, conclusion ,record correction
11	1st	Study of an O.C.B
	2nd	Practical observation, conclusion ,record correction
12	1st	Study of induction type over current / reverse power relay
	2nd	Practical observation, conclusion ,record correction
13	1st	Study of Buchholz's relay
	2nd	Practical observation, conclusion ,record correction
14	1st	Study of an earth fault relay
	2nd	Practical observation, conclusion ,record correction
15	1st	End-sessional evaluation
	2nd	Doubt Clearance

Discipline- Electrical Engg.	Semester-5th	Name of the teaching facualty- Sidharth Sankar Sahu
Subject- Power Electronics & PLC Lab	No of days/week class allotted-1	No of weeks-15 From 14/7/25
Week	Class day	Practical topic
1	1st	Study of switching characteristics of a power transistor
2	1st	Study of V-I characteristics of SCR & TRIAC
3	1st	Study of V-I characteristics of DIAC.
4	1st	Study of drive circuit for SCR & TRIAC using DIAC. Study of voltage source Inverter
5	1st	To study phase controlled bridge rectifier using resistive load
6	1st	Study of drive circuit for SCR & TRIAC using UJT.
7	1st	To study phase controlled bridge rectifier using resistive load.
8	1st	To study series Inverter & Study of voltage source Inverter
9	1st	To perform the speed control of DC motor using Chopper To study single-phase Cyclo-converter
10	1st	Introduction/Familiarization PLC Trainer & its Installation with PC Learn the basics and hardware components of PLC Understand configuration of PLC system
11	1st	Study various building blocks of PLC Determine the No. of digital I/O & Analog I/O
12	1st	Execute the different Ladder Diagrams Demonstrate PLC and Ladder diagram-Preparation downloading and running Execute Ladder diagrams for different Logical Gates
13	1st	Execute Ladder diagrams using timers & counters & Execute the Ladder Diagrams with model applications (i) DOL starter (ii)Star- Delta starter
14	1st	Execute Ladder diagrams with model applications (i) Stair case lighting (ii) Traffic light controller
15	1st	Practical observation, conclusion ,record correction ,End-sessional evaluation Practical observation, conclusion, record correction

Discipline- Electrical Engg.	Semester-5th	Name of the teaching faculty- Sidharth Sankar Sahu
Subject- Power electronics & PLC	No of days/week class allotted-4	Semester from- 14/7/2025 No of weeks-15
Week	Class day	Theory topic
1	1st	**Construction, Operation**, V-I characteristics & application of power diode, SCR, DIAC, TRIAC, Power MOSFET, GTO &IGBT.
	2nd	Two transistor analogy of SCR , Gate characteristics of SCR
	3rd	Switching characteristic of SCR during turn on and turn off, Turn on methods of SCR
	4th	Numerical related to gate turn on and off of MOSFET, BJT
2	1st	Different Commutation techniques (Load commutation , voltage commutation and current commutation)
	2nd	SCR protection (Gate Protection)
	3rd	Voltage protection and current protection
	4th	Firing Circuits (General layout diagram of firing circuit)
3	1st	R firing circuits, R-C firing circuit
	2nd	UJT pulse trigger circuit and Synchronous triggering (Ramp Triggering)
	3rd	Limitations of R and RC firing circuits
	4th	Design of Snubber Circuits and numerical to find the value of R and C.
4	1st	**Doubt clearing and revision class**
	2nd	Controlled rectifiers Techniques(Phase Angle, Extinction Angle control), Single quadrant semi converter, two quadrant full converter and dual Converter
	3rd	Working of single-phase half wave controlled converter with Resistive and R-L loads
	4th	Problem solving and realising the wave forms.
5	1st	Understand need of freewheeling diode.
	2nd	Working of single phase fully controlled converter with resistive and R- L loads.
	3rd	Working of three-phase half wave controlled converter with Resistive load
	4th	Working of three phase fully controlled converter with resistive load.
6	1st	Doubt clearing and problem solving
	2nd	Working of single phase AC regulator.
	3rd	Working principle of step up & step down chopper
	4th	Control modes of chopper
7	1st	Operation of chopper in all four quadrants
	2nd	**UNDERSTAND THE INVERTERS AND CYCLO-CONVERTERS**, Classify inverters.
	3rd	Explain the working of series inverter

	4th	Explain the working of parallel inverter
8	1st	Explain the working of single-phase bridge inverter.
	2nd	Explain the basic principle of cyclo converter
	3rd	Explain the working of single-phase step up & step down Cyclo-converter
	4th	Applications of Cyclo-converter
9	1st	Problem solving on inverter and chopper
	2nd	**UNDERSTAND APPLICATIONS OF POWER ELECTRONIC CIRCUITS**, List applications of power electronic circuits
	3rd	List the factors affecting the speed of DC Motors
	4th	Speed control for DC Shunt motor using converter
10	1st	Speed control for DC Shunt motor using chopper
	2nd	List the factors affecting speed of the AC Motors
	3rd	Speed control of Induction Motor by using AC voltage regulator
	4th	Speed control of induction motor by using converters and inverters (V/F control)
11	1st	Working of UPS with block diagram
	2nd	Battery charger circuit using SCR with the help of a diagram
	3rd	Basic Switched mode power supply (SMPS) - explain its working & applications
	4th	Numerical on cyclo-converter
12	1st	**PLC AND ITS APPLICATIONS**, Introduction of Programmable Logic Controller(PLC)
	2nd	Advantages of PLC
	3rd	Different parts of PLC by drawing the Block diagram and purpose of each part of PLC.
	4th	**Applications of PLC**
13	1st	Different Ladder diagrams
	2nd	Description of contacts and coils in the following states i)Normally open ii) Normally closed iii) Energized output iv)latched Output v) branching
	3rd	Ladder diagrams for i) AND gate ii) OR gate and iii) NOT gate
	4th	Ladder diagrams for combination circuits using NAND,NOR, AND, OR and NOT
14	1st	Timers-i)T ON ii) T OFF and iii)Retentive timer
	2nd	Counters-CTU, CTD
	3rd	Ladder diagrams using Timers and counters
	4th	PLC Instruction set
15	1st	Ladder diagrams for following (i) DOL starter and STAR-DELTA starter (ii) Stair case lighting (iii)

		Traffic light Control (iv) Temperature Controller
	2nd	Special control systems- Basics DCS & SCADA systems
	3rd	Computer Control–Data Acquisition, Direct Digital Control System (Basics only)
	4th	**Doubt Clearance**