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DEPARTMENT OF ELECTRICAL ENGINEERING

Govt. Polytechnic, Balasore

LESSON PLAN FOR ACADEMIC SESSION - 2024-25
POWER ELECTRONICS AND PLC

Course Code : Th.5	**Semester : 5th**
Total Periods : 60 Periods	**Examination : 3 Hours**
Theory Periods : 4 P/Week	**Internal Assessment : 20 Marks**
Tutorial : -	**End Semester Examination : 80 Marks**
Maximum Marks : 100	
Semester From Date : 01/07/2024	**To Date : 16/12/2024**
Name of Teaching Faculty: Er. Radha Rani Panda	

WEEK	PERIOD	TOPIC
1st	1st	**UNDERSTAND THE CONSTRUCTION AND WORKING OF POWER ELECTRONIC DEVICES** Construction, Operation, V-I characteristics & application of power diode, SCR
	2nd	Construction, Operation, V-I characteristics & application of DIAC,TRIAC
	3rd	Construction, Operation, V-I characteristics & application of Power MOSFET,GTO & IGBT
	4th	Two transistor analogy of SCR.
2nd	1st	Gate characteristics of SCR.
	2nd	Switching characteristic of SCR during turn on.
	3rd	Switching characteristic of SCR during turn off.
	4th	Turn on methods of SCR.
3rd	1st	Turn off methods of SCR (Line commutation and Forced commutation) Load Commutation
	2nd	Resonant pulse commutation
	3rd	Voltage and Current ratings of SCR.
	4th	Protection of SCR Over voltage protection Over current protection
4th	1st	Gate protection
	2nd	Firing Circuits General layout diagram of firing circuit
	3rd	R firing circuits
	4th	R-C firing circuit
5th	1st	UJT pulse trigger circuit Synchronous triggering (Ramp Triggering)

	2nd	Design of Snubber Circuits
	3rd	**UNDERSTAND THE WORKING OF CONVERTERS, AC REGULATORS AND CHOPPERS.** Controlled rectifiers Techniques (Phase Angle, Extinction Angle control), Single quadrant semi converter.
	4th	Two quadrant full converter and dual Converter.
6th	1st	Working of single-phase half wave controlled converter with Resistive load.
	2nd	Working of single-phase half wave controlled converter with R-L load & Understand need of freewheeling diode.
	3rd	Working of single phase fully controlled converter with resistive load
	4th	Working of single phase fully controlled converter with R- L load
7th	1st	Working of three-phase half wave controlled converter with Resistive load
	2nd	Working of three phase fully controlled converter with resistive load
	3rd	Working of single phase AC regulator.
	4th	Working principle of step up & step down chopper & Control modes of chopper
8th	1st	Operation of chopper in all four quadrants.
	2nd	Operation of chopper in all four quadrants.
	3rd	**UNDERSTAND THE INVERTERS AND CYCLO-CONVERTERS** Introduction & Classification of inverters
	4th	Explain the working of series inverter
9th	1st	Explain the working of parallel inverter
	2nd	Explain the working of single-phase bridge inverter
	3rd	Explain the basic principle of Cyclo-converter
	4th	Explain the working of single-phase step up Cyclo-converter
10th	1st	Explain the working of single-phase step down Cyclo-converter
	2nd	Applications of Cyclo-converter.
	3rd	**UNDERSTAND APPLICATIONS OF POWER ELECTRONIC CIRCUITS** List applications of power electronic circuits
	4th	List the factors affecting the speed of DC Motors
11th	1st	Speed control for DC Shunt motor using converter
	2nd	Speed control for DC Shunt motor using chopper
	3rd	List the factors affecting speed of the AC Motors.
	4th	Speed control of Induction Motor by using AC voltage regulator
12th	1st	Speed control of induction motor by using converters and inverters (V/F control).
	2nd	Working of UPS with block diagram.
	3rd	Battery charger circuit using SCR with the help of a diagram.
	4th	Basic Switched mode power supply (SMPS) - explain its working & applications
13th	1st	**PLC AND ITS APPLICATIONS** Introduction of Programmable Logic Controller(PLC) & Advantages of PLC
	2nd	Different parts of PLC by drawing the Block diagram and purpose of each part of PLC
	3rd	Applications of PLC & Ladder diagram
	4th	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	Ladder diagrams for i) AND gate ii) OR gate and iii) NOT gate
	2nd	Ladder diagrams for combination circuits using NAND,NOR, AND, OR and NOT
	3rd	Timers-i)T ON ii) T OFF and iii)Retentive timer
	4th	Counters-CTU, CTD
15th	1st	Ladder diagrams using Timers and counters & PLC Instruction set
	2nd	Ladder diagrams for following (i) DOL starter and STAR-DELTA starter (ii) Stair case lighting (iii) Traffic light Control (iv) Temperature Controller
	3rd	Special control systems- Basics DCS & SCADA systems
	4th	Computer Control–Data Acquisition, Direct Digital Control System (Basics only)