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DEPARTMENT OF ELECTRICAL ENGINEERING

Govt. Polytechnic, Balasore

LESSON PLAN FOR ACADEMIC SESSION - 2023-24 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 : - Nt	End Semester Examination : 80 Marks
Maximum Marks : 100	
Semester From Date : 01/08/2023	To Date : 08/12/23
Name of Teaching Faculty: Er. Radha Rani Panda	

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

	2 nd	Design of Snubber Circuits
	3 rd	UNDERSTAND THE WORKING OF CONVERTERS, AC REGULATORS AND CHOPPERS. Controlled rectifiers Techniques (Phase Angle, Extinction Angle control), Single quadrant semi converter.
	4 th	Two quadrant full converter and dual Converter.
6 th	1 st	Working of single-phase half wave controlled converter with Resistive load.
	2 nd	Working of single-phase half wave controlled converter with R-L load & Understand need of freewheeling diode.
	3 rd	Working of single phase fully controlled converter with resistive load
	4 th	Working of single phase fully controlled converter with R- L load
7 th	1 st	Working of three-phase half wave controlled converter with Resistive load
	2 nd	Working of three phase fully controlled converter with resistive load
	3 rd	Working of single phase AC regulator.
	4 th	Working principle of step up & step down chopper & Control modes of chopper
8 th	1 st	Operation of chopper in all four quadrants.
	2 nd	Operation of chopper in all four quadrants.
	3 rd	UNDERSTAND THE INVERTERS AND CYCLO-CONVERTERS Introduction & Classification of inverters
	4 th	Explain the working of series inverter
9 th	1 st	Explain the working of parallel inverter
	2 nd	Explain the working of single-phase bridge inverter
	3 rd	Explain the basic principle of Cyclo-converter
	4 th	Explain the working of single-phase step up Cyclo-converter
10 th	1 st	Explain the working of single-phase step down Cyclo-converter
	2 nd	Applications of Cyclo-converter.
	3 rd	UNDERSTAND APPLICATIONS OF POWER ELECTRONIC CIRCUITS List applications of power electronic circuits
	4 th	List the factors affecting the speed of DC Motors
11 th	1 st	Speed control for DC Shunt motor using converter
	2 nd	Speed control for DC Shunt motor using chopper
	3 rd	List the factors affecting speed of the AC Motors.
	4 th	Speed control of Induction Motor by using AC voltage regulator
12 th	1 st	Speed control of induction motor by using converters and inverters (V/F control).
	2 nd	Working of UPS with block diagram.
	3 rd	Battery charger circuit using SCR with the help of a diagram.
	4 th	Basic Switched mode power supply (SMPS) - explain its working & applications
13 th	1 st	PLC AND ITS APPLICATIONS Introduction of Programmable Logic Controller(PLC) & Advantages of PLC
	2 nd	Different parts of PLC by drawing the Block diagram and purpose of each part of PLC
	3 rd	Applications of PLC & Ladder diagram
	4 th	Description of contacts and coils in the following states i) Normally open ii) Normally closed iii) Energized output iv) latched Output v) branching

14 th	1 st	Ladder diagrams for i) AND gate ii) OR gate and iii) NOT gate
	2 nd	Ladder diagrams for combination circuits using NAND, NOR, AND, OR and NOT
	3 rd	Timers-i) T ON ii) T OFF and iii) Retentive timer
	4 th	Counters-CTU, CTD
15 th	1 st	Ladder diagrams using Timers and counters & PLC Instruction set
	2 nd	Ladder diagrams for following (i) DOL starter and STAR-DELTA starter (ii) Stair case lighting (iii) Traffic light Control (iv) Temperature Controller
	3 rd	Special control systems- Basics DCS & SCADA systems
	4 th	Computer Control-Data Acquisition, Direct Digital Control System (Basics only)

Panda
01/08/2023
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