

# INSTITUTE OF ENGINEERING AND MANAGEMENT

## GOURAHARI VIHAR, PO: RANIPUT, JEYPORE – 764 005

### LESSON PLAN

**Name of the Subject:**Power electronics&Plc

**Name of the Faculty:** Hrudaya Kumar Panigrahi

**Semester:** Fifth Semester

**Branch:**Electrical

**Semester From:** July to December

**No. of Weeks:** 16Weeks

Week	Day	Theory/ Practical Topics	Classes
		<b>Unit 1 -Understand The Construction And Working Of Power Electronic Devices</b>	18
1	1	Construction, Operation, V-I characteristics & application of power diode,	1
	2	SCR, DIAC, TRIAC,	1
	3	Power MOSFET	1
	4	GTO & IGBT	1
2	5	Two transistor analogy of SCR.	1
	6	Gate characteristics of SCR.	1
	7	Switching characteristic of SCR during turn on and turn off.	1
	8	Turn on methods of SCR.	1
3	9	Turn off methods of SCR (Line commutation and Forced commutation) Load Commutation	1
	10	Resonant pulse commutation	1
	11	Voltage and Current ratings of SCR.	1
4	12	Protection of SCR , Over voltage protection, Over current protection	1
	13	Gate protection	1
	14	Firing Circuits, General layout diagram of firing circuit	1
	15	R firing circuits , R-C firing circuit	1
5	16	UJT pulse trigger circuit	1
	17	Synchronous triggering (Ramp Triggering)	1
	18	Design of Snubber Circuits	1
		<b>Unit 2 - UNDERSTAND THE WORKING OF CONVERTERS, AC REGULATORS AND CHOPPERS.</b>	12
	19	Controlled rectifiers Techniques(Phase Angle, Extinction Angle control), Single uadrant semi converter	1
6	20	Two quadrant full converter	1
	21	Dual Converter	1
	22	Working of single-phase half wave controlled converter with Resistive and R-L loads	

	23	Understand need of freewheeling diode.	1
7	24	Working of single phase fully controlled converter with resistive and R- L loads.	1
	25	Working of three-phase half wave controlled converter with Resistive load	1
	26	Working of three phase fully controlled converter with resistive load.	1
	27	Working of single phase AC regulator	1
8	28	Working principle of step up chopper	2
	29	Working principle of step down chopper	
	30	Control modes of chopper	1
	31	Operation of chopper in all four quadrants.	1
		<b>UNIT -3 UNDERSTAND THE INVERTERS AND CYCLO-CONVERTERS</b>	8
9	32	Classify inverters	1
	33	Explain the working of series inverter.	1
	34	Explain the working of parallel inverter	1
	35	Explain the working of single-phase bridge inverter	1
10	36	Explain the basic principle of Cyclo-converter	1
	37	Explain the working of single-phase step up Cyclo-converter	1
	38	Explain the working of single-phase stepdown Cyclo-converter	1
	39	Applications of Cyclo-converter.	1
		<b>UNIT-4 UNDERSTAND APPLICATIONS OF POWER ELECTRONIC CIRCUITS</b>	10
11	40	List applications of power electronic circuits.	1
	41	List the factors affecting the speed of DC Motors.	1
	42	Speed control for DC Shunt motor using converter	1
	43	Speed control for DC Shunt motor using chopper	1
12	44	List the factors affecting speed of the AC Motors.	1
	45	Induction Motor by using AC voltage regulator	1
	46	Speed control of induction motor by using converters and inverters (V/F control).	1
	47	Working of UPS with block diagram.	1
13	48	Battery charger circuit using SCR with the help of a diagram	1
	49	Basic Switched mode power supply (SMPS) - explain its working & application	1
		<b>Unit-5- PLC AND ITS APPLICATIONS</b>	12

	50	Introduction of Programmable Logic Controller(PLC)	1
	51	Advantages of PLC	1
14	52	Different parts of PLC by drawing the Block diagram and purpose of each part of PLC.	1
	53	Applications of PLC , Ladder diagram	1
	54	Description of contacts and coils in the following states i)Normally open ii) Normally closed iii) Energized output iv)latched Output v) ranching	1
	55	Ladder diagrams for i) AND gate ii) OR gate and iii) NOT gate.	1
15	56	Ladder diagrams for combination circuits using NAND,NOR, AND, OR and NOT	1
	57	Timers-i)T ON ii) T OFF and iii)Retentive timer Counters-CTU, CTD	1
	58	Ladder diagrams using Timers and counters PLC Instruction set	1
	59	Ladder diagrams for following i) DOL starter and STAR-DELTA starter (ii) Stair case lighting (iii) Traffic light Control (iv) Temperature Controller	1
16	60	Special control systems- Basics DCS & SCADA systems	1
	61	SCADA systems Computer Control–Data Acquisition	1
	62	Direct Digital Control System (Basics only)	1

### **RECOMMENDED BOOKS**

Learning Resources: Sl.No Title of the Book Name of Authors Name of the Publisher

1. Power Electronics Dr. P. S. Bhimbhra Khanna Publisher  
2. Modern Power Electronics B.K.Bose PHI Publisher and AC Drives  
3. Power Electronics M. D. Singh and K.B Khanchandani TMH  
4. Power Electronics M H Rashid PHI Publisher  
5. Power Electronics P C Sen TMH  
6. Power Electronics N Mohan Willey (India)  
7. Programmable logic Controllers Frank D. Petruzela TMH  
8. Programme logic controller Dr.M.Mitra&Dr.S.Sengupta Penram