

## Lesson Plan

<b>Discipline:</b> Electrical, <b>Semester:</b> 5th, <b>Name of Faculty :</b> BINAYAK DASH		
<b>Subject:</b> Power Electronics & PLC	<b>No. of days/ week</b> <b>Class allotted: 4</b>	<b>Semester From Date:</b> 16.01.2024 <b>To date</b> <b>: 23.05.2024</b>
<b>Week</b>	<b>Class Day</b>	<b>Theory</b>
<b>1st</b>	<b>1st</b>	<b>UNDERSTAND THE CONSTRUCTION AND WORKING OF POWER ELECTRONIC DEVICES</b> Construction, Operation, V-I characteristics & application of power diode, SCR, DIAC
	<b>2nd</b>	Construction, Operation, V-I characteristics & application of TRIAC, Power MOSFET, GTO & IGBT
	<b>3rd</b>	Two transistor analogy of SCR
	<b>4th</b>	Gate characteristics of SCR.
<b>2nd</b>	<b>1st</b>	<u>Switching characteristic of SCR during turn on and turn off.</u> Turn on methods of SCR.
	<b>2nd</b>	Turn off methods of SCR (Line commutation and Forced commutation)
	<b>3rd</b>	Load Commutation
	<b>4th</b>	<u>Resonant pulse commutation</u> Voltage and Current ratings of SCR.
<b>3rd</b>	<b>1st</b>	Protection of SCR
	<b>2nd</b>	Over voltage protection Over current protection
	<b>3rd</b>	Over current protection
	<b>4th</b>	Gate protection
<b>4th</b>	<b>1st</b>	Firing Circuits General layout diagram of firing circuit
	<b>2nd</b>	R firing circuits

	3rd	R-C firing circuit
	4th	UJT pulse trigger circuit
5th	1st	Synchronous triggering (Ramp Triggering )
	2nd	0 Design of Snubber Circuits
	3rd	Question discussion

	4th	Doubt clearing class
6th	1st	Class test
	2nd	<b>UNDERSTAND THE WORKING OF CONVERTERS, AC REGULATORS AND CHOPPERS</b> 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	Understand need of freewheeling diode.
7th	1st	Working of single phase fully controlled converter with resistive and R- L loads
	2nd	Working of three-phase half wave controlled converter with Resistive load
	3rd	Working of three phase fully controlled converter with resistive load.
	4th	Working of single phase AC regulator
	1st	Working principle of step up & step down
	2nd	chopper Control modes of chopper
	3rd	Operation of chopper in all four quadrants
8th	4th	Question discussion and problem solving class

<b>9th</b>	<b>1st</b>	Doubt clearing class
	<b>2nd</b>	Class test
	<b>3rd</b>	<b>UNDERSTAND THE INVERTERS AND CYCLO-CONVERTERS</b> Classify inverters. Explain the working of series inverter
	<b>4th</b>	Explain the working of parallel inverter Explain the working of single-phase bridge inverter.
<b>10th</b>	<b>1st</b>	Explain the basic principle of Cyclo-converter. 3.6 Explain the working of single-phase step up & step down Cyclo-converter
	<b>2nd</b>	Applications of Cyclo-converter Doubt clearing and problem solving
	<b>3rd</b>	Class test.
	<b>4th</b>	<b>UNDERSTAND APPLICATIONS OF POWER ELECTRONIC CIRCUITS</b> List applications of power electronic circuits. List the factors affecting the speed of DC Motors

<b>11th</b>	<b>1st</b>	Speed control for DC Shunt motor using converter. Speed control for DC Shunt motor using chopper.
	<b>2nd</b>	List the factors affecting speed of the AC Motors. Speed control of Induction Motor by using AC voltage regulator.
	<b>3rd</b>	Speed control of induction motor by using converters and inverters (V/F control). Working of UPS with block diagram.
	<b>4th</b>	Battery charger circuit using SCR with the help of a diagram. Basic Switched mode power supply (SMPS) - explain its working & applications Doubt clearing
<b>12th</b>	<b>1st</b>	class test

<b>13th</b>	<b>2nd</b>	<b>PLC AND ITS APPLICATIONS</b> Introduction of Programmable Logic Controller(PLC) <u>Advantages of PLC</u> Different parts of PLC by drawing the Block diagram and purpose of each part of PLC. 5.4 Applications of PLC 5.5 Ladder diagram Description of contacts and coils in the following states i)Normally open ii) Normally closed iii) Energized output iv)latched Output v) <u>branching</u> Ladder diagrams for i) AND gate ii) OR gate and iii) NOT gate.
	<b>3rd</b>	
	<b>4th</b>	
	<b>1st</b>	
	<b>2nd</b>	
	<b>3rd</b>	Timers-i)T ON ii) T OFF and iii)Retentive timer
	<b>4th</b>	Counters-CTU, CTD
<b>14th</b>	<b>1st</b>	Ladder diagrams using Timers and counters
	<b>2nd</b>	PLC Instruction set
	<b>3rd</b>	Ladder diagrams for following (i) DOL starter and STAR-DELTA starter (ii) Stair case lighting (iii) Traffic light Control (iv) Temperature Controller
	<b>4th</b>	Special control systems- Basics DCS & SCADA systems
<b>15th</b>	<b>1st</b>	Computer Control–Data Acquisition, Direct Digital Control System (Basics only)
	<b>2nd</b>	Doubt clearing class
	<b>3rd</b>	Diagram practice
	<b>4th</b>	Class test

#### Reference

1. Power Electronics, Dr. P. S. Bhimbhra
2. Modern Power Electronics, B.K.Bose