GOVERNMENT POLYTECHNIC ,NAYAGARH
Department Of Electrical Engineering

Semester: 5TH DIPLOMA

Subject: Power Electronics (Theory)

Branch: Electrical Engineering,

Session: 2021-22

No Of Period :60 (4p/week)

Name of Faculty: Satyabrata Sahoo

Week	Period	Topics to be covered
1st Week	1	Construction, Operation, V-I characteristics & application of power diode
	2	Construction, Operation, V-I characteristics & application of SCR
	3	Construction, Operation, V-I characteristics & application of DIAC
	4	Construction, Operation, V-I characteristics & application of TRIAC
2nd Week	5	Construction, Operation, V-I characteristics & application of Power MOSFET
	6	Construction, Operation, V-I characteristics & application of GTO
	7	Construction, Operation, V-I characteristics & application of IGBT
	8	Two transistor analogy of SCR, Gate characteristics of SCR.
3rd Week	9	Switching characteristic of SCR during turn on and turn off, Turn on methods of SCR.
	10	Turn on methods of SCR.
	11	-do-
	12	Turn off methods of SCR (Line commutation and Forced commutation)
4th Week	13	-do-
	14	Voltage and Current ratings of Thyristor.
	15	Protection of Thyristor
	16	Firing Circuits (General layout diagram, R-fring circuits, Rc-frirng circuits)
5th Week	17	Uni-junction Transistor (Basic operation),Synchronous triggering
	18	Design of snubber circuits
	19	Controlled rectifiers Techniques(Phase Angle, Extinction Angle control), Single quadrant semi converter, two quadrant full converter and dual Converter
	20	-do-
6th Week	21	Working of single-phase half wave controlled converter with Resistive and R-L loads
	22	Understand need of freewheeling diode.
	23	Working of single phase fully controlled converter with resistive and R- L loads
	24	Working of three-phase half wave controlled converter with Resistive load
7th Week	25	Working of three phase fully controlled converter with resistive load
	26	-do-
	27	Working of single phase AC regulator.
	28	Working principle of step up & step down chopper.
8th Week	29	Control modes of chopper
	30	Operation of chopper in all four quadrants
	31	Classify inverters. Explain the working of series inverter.
	32	Explain the working of parallel inverter

	33	Explain the working of single-phase bridge inverter
9th Week	34	Explain the basic principle of Cyclo-converter
	35	Explain the working of single-phase step up Cyclo-converter
	36	Explain the working of single-phase step down Cyclo-converter
	37	Applications of Cyclo-converter.
10th Week	38	List applications of power electronic circuits. List the factors affecting the speed of DC Motors
	39	Speed control for DC Shunt motor using converter.
	40	Speed control for DC Shunt motor using chopper.
11th Week	41	List the factors affecting speed of the AC Motors. Speed control of Induction Motor by using AC voltage regulator.
	42	-do-
	43	Speed control of induction motor by using converters and inverters (V/F control)
	44	Working of UPS with block diagram.
12th Week	45	Battery charger circuit using SCR with the help of a diagram.
	46	Basic Switched mode power supply (SMPS) - explain its working & applications
	47	-do-
	48	Introduction of Programmable Logic Controller(PLC)
13th Week	49	Advantages of PLC , Different parts of PLC by drawing the Block diagram and purpose of each part of PLC.
	50	Applications of PLC
	51	Ladder diagram, Description of contacts and coils in the following states i)Normally open ii) Normally closed
	52	Description of contacts and coils in the following states iii) Energized output iv)latched Output v) branching
14th Week	53	Ladder diagrams for i) AND gate ii) OR gate and iii) NOT gate.
	54	Ladder diagrams for combination circuits using NAND,NOR, AND, OR and NOT
	55	Timers-i)T ON ii) T OFF and iii)Retentive timer
	56	Counters-CTU, CTD, Ladder diagrams using Timers and counters
15th Week	57	PLC Instruction set
	58	Ladder diagrams for (i) DOL starter and STAR-DELTA starter
	59	Ladder diagrams for (ii) Stair case lighting (iii) Traffic light Control(iv) Temperature Controller
	60	Special control systems- Basics DCS & SCADA systems, Computer Control– Data Acquisition, Direct Digital Control System (Basics only)

Satyabrata Sahoo

Signature of Faculty

Signature of HOD