BHUBANANANDA ORISSA SCHOOL OF ENGINEERING, CUTTACK

ELECTRICAL ENGG.DEPARTMENT

LESSON PLAN

SEMESTER:- 5TH (C)

SESSION:- Winter(2022-23)

SUBJECT: Power Electronics and PLC

NAME OF FACULTY : SUKANTA KUMAR NANDI

Discipline: **Electrical Engg.**	Semester: **5th (C)**	Name of the teaching faculty: **SUKANTA KUMAR NANDI**
Subject: **Power Electronics and PLC**	No. of Days/per week class allotted: **04 PERIODS/WEEK (MON,WED,THU,FRI-1 Period Each)**	Semester: From Date: **15/09/2022** To Date: **22/12/2022** No. of weeks: **15 WEEKS**
Week	Class Day	Theory/Practical Topics
1st (15/09/2022-17/09/2022)	15/09/2022	**1. UNDERSTAND THE CONSTRUCTION AND WORKING OF POWER ELECTRONIC DEVICES** 1.1 Construction, Operation, V-I characteristics & application of power diode, SCR, DIAC,TRIAC, Power MOSFET,GTO &IGBT
	16/09/2022	1.1 Construction, Operation, V-I characteristics & application of power diode, SCR, DIAC,TRIAC, Power MOSFET,GTO &IGBT
2nd (19/09/2022-24/09/2022)	19/09/2022	1.2 Two transistor analogy of SCR. 1.3 Gate characteristics of SCR. 1.4 Switching characteristic of SCR during turn on and turn off.
	21/09/2022	1.4 Switching characteristic of SCR during turn on and turn off. 1.5 Turn on methods of SCR.
	22/09/2022	1.6 Turn off methods of SCR (Line commutation and Forced commutation) 1.6.1 Load Commutation
	23/09/2022	1.6.2 Resonant pulse commutation 1.7 Voltage and Current ratings of SCR.
3rd (26/09/2022-01/10/2022)	26/09/2022	1.8 Protection of SCR 1.8.1 Over voltage protection
	28/09/2022	1.8.2 Over current protection 1.8.3 Gate protection
	29/09/2022	1.8.3 Gate protection 1.9 Firing Circuits 1.9.1 General layout diagram of firing circuit
	30/09/2022	1.9 Firing Circuits 1.9.1 General layout diagram of firing circuit

4th (03/10/2022-08/10/2022)		
5th (10/10/2022-15/10/2022)	10/10/2022	PUJA HOLIDAYS
	12/10/2022	1.9.2 R firing circuits 1.9.4 UJT pulse trigger circuit
	13/10/2022	1.9.3 R-C firing circuit
	14/10/2022	1.9.4 UJT pulse trigger circuit
6th (17/10/2022-22/10/2022)	17/10/2022	1.9.5 Synchronous triggering Ramp Triggering
	19/10/2022	1.10 Design of Snubber Circuits **2. UNDERSTAND THE WORKING OF CONVERTERS, AC REGULATORS AND CHOPPERS.** 2.1 Controlled rectifiers Techniques(Phase Angle, Extinction Angle control), Single quadrant semi converter, two quadrant full converter and dual Converter
	20/10/2022	2.2 Working of single-phase half wave controlled converter with Resistive and R-L loads.
	21/10/2022	**Class test 1**
7th (24/10/2022-29/10/2022)	24/10/2022	**Kali Puja/Diwali**
	26/10/2022	2.3 Understand need of freewheeling diode. 2.4 Working of single phase fully controlled converter with Resistive and R- L loads..
	27/10/2022	2.5 Working of three-phase half wave controlled converter with Resistive load
	28/10/2022	2.6 Working of three phase fully controlled converter with Resistive load.
8th (31/10/2022-05/11/2022)	31/10/2022	2.7 Working of single phase AC regulator. 2.8 Working principle of step up & step down chopper.
	02/11/2022	2.9 Control modes of chopper
	03/11/2022	2.10 Operation of chopper in all four quadrants.
	04/11/2022	**3. UNDERSTAND THE INVERTERS AND CYCLO-CONVERTERS** 3.1 Classify inverters.

9th (07/11/2022-12/11/2022)	07/11/2022	3.2 Explain the working of series inverter.
	09/11/2022	3.2 Explain the working of series inverter.
	10/11/2022	3.3Explain the working of parallel inverter.
10th (14/11/2022-19/11/2022)	11/11/2022	3.4Explain the working of single phase bridge inverter.
	14/11/2022	3.5 Explain the basic principle of Cyclo-converter.
	16/11/2022	3.6 Explain the working of single-phase step up & step down Cyclo-converter. **Internal Assessment**
	17/11/2022	3.7 Applications of Cyclo-converter.
	18/11/2022	**4. UNDERSTAND APPLICATIONS OF POWER ELECTRONIC CIRCUITS** 4.1 List applications of power electronic circuits.
11th (21/11/2022-26/11/2022)	21/11/2022	4.2 List the factors affecting the speed of DC Motors. 4.3 Speed control for DC Shunt motor using converter.
	23/11/2022	4.4 Speed control for DC Shunt motor using chopper.
	24/11/2022	4.5 List the factors affecting speed of the AC Motors. 4.6 Speed control of Induction Motor by using AC voltage regulator.
	25/11/2022	4.7 Speed control of induction motor by using converters and inverters (V/F control)
12th (28/11/2022-03/12/2022)	28/11/2022	4.8 Working of UPS with block diagram.
	30/11/2022	4.9 Battery charger circuit using SCR with the help of a diagram
	01/12/2022	4.10 Basic Switched mode power supply (SMPS) - explain its working & applications
	02/12/2022	**Quiz test**
13th (05/12/2022-10/12/2022)	05/12/2022	**5. PLC AND ITS APPLICATION** 5.1 Introduction of Programmable Logic Controller(PLC) 5.2 Advantages of PLC
	07/12/2022	5.3 Different parts of PLC by drawing the Block diagram

		and purpose of each part of PLC. 5.4 Applications of PLC
	08/12/2022	5.5 Ladder diagram 5.6 Description of contacts and coils in the following states i)Normally open ii) Normally closed iii) Energized output iv)latched Output v) branching
	09/12/2022	5.7 Ladder diagrams for i) AND gate ii) OR gate and iii) NOT gate.
14th (12/12/2022-17/12/2022)	12/12/2022	5.8 Ladder diagrams for combination circuits using NAND,NOR, AND, OR and NOT 5.9 Timers-i)T ON ii) T OFF and iii)Retentive timer
	14/12/2022	5.10 Counters-CTU, CTD
	15/12/2022	5.11 Ladder diagrams using Timers and counters 5.12 PLC Instruction set
	16/12/2022	**Class test 2**
15th (19/12/2022-22/12/2022)	19/12/2022	5.13 Ladder diagrams for following (i) DOL starter and STAR-DELTA starter (ii) Stair case lighting (iii) Traffic light Control (iv) Temperature Controller
	21/12/2022	5.14 Special control systems- Basics DCS & SCADA systems 5.15 Computer Control–Data Acquisition, Direct Digital Control System (Basics only)
	22/12/2022	5.15 Computer Control–Data Acquisition, Direct Digital Control System (Basics only) **REVISION**