

# LESSON PLAN FOR POWER ELECTRONICS AND PLC 5<sup>TH</sup> SEM ELECTRONICS

| Discipline:-<br>Electronics          | Semester:-<br>5th                              | Name Of The Teaching Faculty:-<br>B.Subhalaxmi Pani   |
|--------------------------------------|--|---|
| Subject:-<br>Power electronics & PLC | No Of Days<br>Per week<br>Class<br>Allotted:-4 | From 15/09/2022 To 22/12/2022   |
| No. of week                          | No. of class                                   | No Of Weeks:-15<br>Topic to be taught   |
| 1 <sup>st</sup>                      | 1  | <b>UNDERSTAND THE CONSTRUCTION AND WORKING OF POWER ELECTRONIC DEVICES:</b> 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   |
| 2 <sup>nd</sup>                      | 5  | Construction, Operation, V-I characteristics & application of MOSFET  |
|                                      | 6  | Construction, Operation, V-I characteristics & application of GTO & IGBT  |
|                                      | 7  | Two transistor analogy of SCR.  |
|                                      | 8  | Gate characteristics of SCR.  |
| 3 <sup>rd</sup>                      | 9  | Switching characteristic of SCR during turn on and turn off.  |
|                                      | 10   | Turn on methods of SCR.   |
|                                      | 11   | Turn off methods of SCR   |
|                                      | 12   | Load Commutation  |
| 4 <sup>th</sup>                      | 13   | Resonant pulse commutation  |
|                                      | 14   | Voltage and Current ratings of SCR.   |
|                                      | 15   | Protection of SCR Over voltage protection, Over current protection, Gate protection   |
|                                      | 16   | Firing Circuits, General layout diagram of firing circuit, R firing circuits, R-C firing circuit  |
| 5 <sup>th</sup>                      | 17   | UJT pulse trigger circuit Synchronous triggering  |
|                                      | 18   | Design of Snubber Circuits  |
|                                      | 19   | <b>UNDERSTAND THE WORKING OF CONVERTERS, AC REGULATORS AND CHOPPERS:</b> Controlled rectifier Techniques  |
|                                      | 20   | Single quadrant semi converter  |
| 6 <sup>th</sup>                      | 21   | two quadrant full converter and dual Converter  |
|                                      | 22   | Working of single-phase half wave controlled converter with Resistive and R-L loads.  |
|                                      | 23   | Understand need of freewheeling diode.  |
|                                      | 24   | Working of single phase fully controlled converter with resistive and R- L loads.   |
| 7 <sup>th</sup>                      | 25   | Working of three-phase half wave controlled converter with Resistive load   |
|                                      | 26   | Working of three phase fully controlled converter with resistive load.  |
|                                      | 27   | Working of single phase AC regulator.   |
|                                      | 28   | Working principle of step up & step down chopper.   |

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| 8 <sup>th</sup>  | 29 | Control modes of chopper   |
|                  | 30 | Operation of chopper in all four quadrants.  |
|                  | 31 | <b>UNDERSTAND THE INVERTERS AND CYCLO-CONVERTERS and Classify inverters.</b>   |
|                  | 32 | Explain the working of series inverter.  |
| 9 <sup>th</sup>  | 33 | Explain the working of parallel inverter   |
|                  | 34 | Explain the working of single-phase bridge inverter.   |
|                  | 35 | Explain the basic principle of Cyclo-converter.  |
|                  | 36 | Explain the working of single-phase step up step down  |
| 10 <sup>th</sup> | 37 | step down Cyclo-converter. Applications of Cyclo-converter.  |
|                  | 38 | Question discussion  |
|                  | 39 | <b>UNDERSTAND APPLICATIONS OF POWER ELECTRONIC CIRCUITS:</b> List applications of power electronic circuits.   |
|                  | 40 | List the factors affecting the speed of DC Motors.   |
| 11 <sup>th</sup> | 41 | Speed control for DC Shunt motor using converter.  |
|                  | 42 | Speed control for DC Shunt motor using chopper.  |
|                  | 43 | List the factors affecting speed of the AC Motors.   |
|                  | 44 | Speed control of Induction Motor by using AC voltage regulator.  |
| 12 <sup>th</sup> | 45 | Speed control of induction motor by using converters and inverters (V/F control).  |
|                  | 46 | Working of UPS with block diagram.   |
|                  | 47 | Battery charger circuit using SCR with the help of a diagram.  |
|                  | 48 | Basic Switched mode power supply (SMPS) - explain its working & applications   |
|                  | 49 | <b>PLC AND ITS APPLICATIONS:</b> Introduction of Programmable Logic Controller(PLC)  |
| 13 <sup>th</sup> | 50 | Advantages of PLC, Different parts of PLC by drawing the Block diagram and purpose of each part of PLC.  |
|                  | 51 | Applications of PLC, Ladder diagram  |
|                  | 52 | Description of contacts and coils in the following states<br>i) Normally open ii) Normally closed iii) Energized output<br>iv) latched Output v) branching |
| 14 <sup>th</sup> | 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 5.10 Counters-CTU, CTD   |
|                  | 56 | Ladder diagrams using Timers and counters  |
| 15 <sup>th</sup> | 57 | PLC Instruction set  |
|                  | 58 | Ladder diagrams for following (i) DOL starter and STAR-DELTA starter (ii) Stair case lighting (iii) Traffic light Control (iv) Temperature Controller      |
|                  | 59 | Special control systems- Basics DCS & SCADA systems  |
|                  | 60 | Computer Control–Data Acquisition, Direct Digital Control System (Basics only) and question discussion.  |

B. Subhalaxmi pari  
31/10/2022  
Sign of Faculty

31/10/2022  
sign. Of H.O.D

31/10/2022  
Principal  
Govt. Polytechnic  
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