



Master of Science (Electronics)
M.Sc.(Electronics) Semester II

Course Code	PS02EELE51	Title of the Course	Industrial Electronics
Total Credits of the Course	4	Hours per Week	3+1=4 Hours

Course Objectives:	<ol style="list-style-type: none">1. To learn theoretical aspects and operating behaviour of different types of power semi-conductor devices.2. To understand the switching characteristics of power control devices.3. To identify the performance parameters of controlled rectifiers.4. To Introduce the basic concept of PLC Hardware, Programming and its applications.
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Course Content		
Unit	Description	Weightage* (%)
1.	Power Semiconductor Switches – Characteristics, Power diodes, Thyristors, Controllable Switches, Power MOSFET, Gate-Turn-off Thyristor (GTO), Insulated Gate Bi-Polar Transistors(IGBT), MOS Controlled Thyristors.	25
2.	SMPS converters, Three-phase Rectifiers, Three-phase controlled rectifiers, Inverters, Cyclo converter, Synch-Servo Control mechanism, Stepper Motor Types, Operation modes, Excitation Modes, Modes of Damping, Stepper motor control, Applications.	25
3.	Industrial applications - Automatic Weighing system, Carbon dioxide controller for a carburizing furnace, control of relative humidity in a Textile moistening process and warehouse, Induction Heating, Theory and effect of frequency and source voltage on Induction Heating, Choice of Frequency for Induction heating, Dielectric Heating.	25
4.	Sequential Process Control, Relay Based system, Ladder Logic Diagram, Programmable logic controller, Operational Procedures, Applications, PLC ladder instructions –Address and Registers, Timers and counters.	25

Teaching-Learning Methodology	Classroom Teaching (Online/Offline) , Use of Power point Presentation, Tutorial Problem Solving, Assignments, Group Discussion, Use of ICT Tools, Video Animation and Presentation, Experimental demonstration.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Grasp the deep understanding of latest Power electronic devices.
2.	Acquire the knowledge of Inverters and converters.
3.	Learn the Applications of Power control devices in Industry.
4.	Gain the understanding of PLC system and Ladder programming.
5.	Able to use PLCs for specific application .
Suggested References:	
Sr. No.	References
1.	Industrial Electronics (4 th Edition) James Humphries, Leslie Sheets (Delmar Publishers Inc., N.Y., USA)
2.	Power Electronics Ned Mohan, Tore M. Undel and William P. Robbins, (John Wiley & Sons, N.Y, USA)
3.	Industrial Solid State Electronics Devices and system (2 nd Edition) Timothy J. Maloney, (Prentice Hall International, N.Y., USA)
4.	Power Electronics M.S. Jamil Asghar, (Prentice Hall Of India Pvt. Ltd. New Delhi, INDIA)
5.	Industrial Electronics and Control Biswanath Paul, (Prentice Hall of India, New Delhi, INDIA)
6.	Power Electronics-Circuits, Devices and Applications Muhammad H. Rashid (Prentice-Hall International Inc., New Delhi)





7.	Electronics in Industry G.M.Chute, Robert D.Chute (McGraw–Hill Book Company)
8.	Fundamentals of Industrial Electronics Bogdan M.Wilamowski, J.David Irwin
9.	Industrial Electronics & Control S K Bhattacharya, S.Chatterjee (Tata McGraw-Hill Publishing Company Limited, New Delhi)
10.	The Power Electronics Handbook Timothy L. Skvarenina (CRC Press, USA)
11.	Modern Industrial Electronics T.J.Maloney
12.	Modern Power Electronics and A.C. Drives B. K. Bose (Pearson Education).
13.	Programmable Logic Controllers : Principles and Applications John W.Webb and Ronald A.Reis (Prentice Hall of India, New Delhi, INDIA)
14.	Power Electronics J.S.Chitode (Technical Publications)

On-line resources to be used if available as reference material

On-line Resources

1. <https://www.industrial-electronics.com/>

2. https://www.powershow.com/view4/7b170d-NDQ1N/Introduction_to_Industrial_Electronics_powerpoint_ppt_presentation

3. <https://pinoybix.org/2013/11/industrial-electronics-lecture-1.html>

4. <http://hibp.ecse.rpi.edu/~connor/edw-ecse.ppt>

5. On Line Video Lectures of course on Power Electronics - NPTEL

