

Syllabus

Electronics & Metallurgical Industrial Instrumentation

Subject Code: ECE-406/ ECE 406P

L T P: 2 0 0

Credits: 02

Contents

S. No.	Particulars	Contact Hours
1.	Construction, symbol and characteristics of semiconductors diodes, transistors and silicon-controlled rectifiers. Rectifiers and invertors. Motor control.	13
2.	Induction and dielectric heating. Electric arc furnaces and their accessories. Ultrasonic waves and their applications. Pulse, digital and switching circuits and systems. Transducers.	15
3.	Measurements of current, voltage, power and energy. Cathode-ray oscilloscope and its applications.	10
4.	Temperature control, gas flow and fluid flow controls, PID, load cells, and strain gauge etc.	04
	Total	42

Text Books:

S. No.	Name of the Book	Author(s)	Publisher	Year of Publications
1.	Pulse Digital and Switching Wave Form	Millman & Taub.	Tata McGraw - Hill	2007
2.	Integrated Electronics	Millman & Halkias.	McGraw-Hill	1972

Additional References:

1.	Electronic Instrumentation and Measurement Techniques-Prentice-Hall, Inc. (1985)	William David Cooper, Albert D Helfrick
2.	Electronic Measurements & Instrumentation-Pearson Education (2012)	K. Lal Kishore
3.	Electronic Measurement and Instrumentation-S Chand & Co Ltd (2013)	R.S. Sedha
4.	Electronic Instrumentation and Measurements-Prentice-Hall of India (2003)	David A Bell
5.	Fundamentals of Industrial Instrumentation and Process Control-McGraw-Hill	William Dunn

6.	(Tutorial Guides in Electronic Engineering) - Instrumentation_ Transducers and Interfacing-Springer Netherlands (1991)	B. R. Bannister, D. G. Whitehead (auth.)
7.	Fuels, Furnaces and Refractories	R.C Gupta
8.	Innovation in Electric Arc Furnaces: Scientific Basis for Selection	Yuri N. Toulouevski, Ilyaz Yunusovich Zinurov

Virtual Laboratories

1.	Vlabs, "Basic Electronics Lab"	http://vlabs.iitkgp.ernet.in/be/
2.	Vlabs "Solid State Physics Lab"	http://vlab.amrita.edu/?sub=1&brch=282

Module No.	Lectures	Videos NPTEL	Additional Reading
I-Basic Electronic devices and Circuits	1. Semiconductor Diodes	https://nptel.ac.in/courses/117103063 "Basic Electronics, IIT Guwahati"	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-720j-integrated-microelectronic-devices-spring-2007/index.htm "Integrated Microelectronic Devices, MIT" Text book 1
	2. Transistors (BJT & MOSFETS)		
	3. Silicon Controlled Rectifiers- SCR		
	4. Inverters		
	5. Rectifiers		
	6. Motor Control		
II-Production Processes-Electric Heating and Transducers	7. Induction Heating	https://www.youtube.com/playlist?list=PLC1A15E0C6761937F "Metallurgy - Fuels Refractory and Furnaces, IIT Kanpur" https://nptel.ac.in/courses/108105064/ "Industrial Instrumentation, IIT Kharagpur"	https://www.youtube.com/watch?v=Bk_mzWoPXDo&list=PLEprwsbQ0B8LwyVcXqzXkkwG68gKlRJoQ Textbook 2
	8. Dielectric Heating		
	9. Electric Arc Furnaces		
	10. Ultrasonic Waves and Application		
	11. Pulse Digital and switching Circuits and Systems		
	12. Transducers		
III-Electrical Measurement	13. Measurement of Current	https://nptel.ac.in/courses/108/105/108105153/ "Electrical Measurement & Electronic Instrument, IIT Kharagpur" Lecture 1-37 Lecture 80-81 (CRO)	Reference 1
	14. Measurement of Voltage		
	15. Measurement of Power		
	16. Measurement of Energy		
	17. CRO & Application		
IV-Process Control	18. Temperature Control	https://nptel.ac.in/courses/108105064/ "Industrial Instrumentation, IIT Kharagpur"	Reference 5
	19. Gas Flow Control		
	20. Fluid Flow Control		
	21. PID		
	22. Load Cell		
	23. Strain Gauge		

Links to Reading Material(Use Institute IDs)

<https://drive.google.com/open?id=1VMsYw87JhaAafj13lzzG2BXge84Yugm>

https://drive.google.com/open?id=1somShxnVKGg6pLcvRFfm_KMyrsG0DC