DISCIPLINE ELECTIVE COURSE: Advanced Electronic Instrumentation (INDSE7C)

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Advanced Electronic Instrumentation (INDSE7C)	04	03	-	01	Course admission eligibility	Analog Electronics-

Learning Objectives

- To provide in-depth knowledge about instrumentation amplifier.
- Discussion of different types of Optical Transducers and display devices. .
- To have extensive knowledge about different measuring instruments

Learning Outcomes

After successful completion of the course, students will be able to:

- Understand and apply the principles of Instrumentation Amplifiers.
- Analyze and implement analog-to-digital and digital-to-analog conversion systems.
- Understand the working and applications of specialized measuring instruments.
- Demonstrate proficiency in modern instrumentation techniques.

SYLLABUS OF DSE

UNIT – I **(12 hours)**

Instrumentation Amplifier & its applications: Instrumentation system, Instrumentation Amplifier using Transducer bridge, Applications of Instrumentation Amplifier-Temperature Indicators using Thermistor and Analog Weight Scale.
Convertors-D/A convertor with Binary-weighted resistors and with R & 2R resistors, Successive approximation A/D converter using Operational Amplifiers.

UNIT – II **(10 hours)**

Indicators: Electrodynamometer, Moving-Iron, Induction type, Electrostatic type.
Display devices: LED, LCD, Dot Matrix Display, Electro-Luminescent Displays

UNIT – III **(12 hours)**

AC measuring Instruments: Digital Capacitance Meter, Electrodynamic type Wattmeter, Reactive power meter, Power factor meter, Watthour meter, Digital Phase meter

Measuring Instruments: Source measuring unit (SMU): working, construction and Applications, Megger

UNIT – IV (11 hours)

Measurement of microwave frequencies: Wavemeters-Resonant Coaxial, Cavity Type and Lumped Type Wavemeter

Measurement of RF power: Bolometer: working principle, Construction and types

Practical Component (Hardware/ Software) (30 hours)

1. Designing of Basic Instrumentation Amplifiers using op-amp.
2. Designing of Instrumentation Amplifier using Transducer bridge
3. Designing of D/A convertor with Binary-weighted resistors
4. Designing of D/A convertor with R & 2R resistors
5. Measurement of power using wattmeter
6. Study of Watthour meter and measurement of electricity consumption in different conditions.
7. Study and analyse the operation of Source measuring unit (SMU).
8. To study diode characteristics using SMU.
9. Measurement of the Q-Factor of a Cavity (Virtual Lab)

Essential/recommended readings

1. BKG: Basic Electronics and Linear Circuits by N. N. Bhargava, D. C. Kulshreshtha and S. C. Gupta. Technical Teachers training Institute, Tata McGraw Hill Publishing Company Limited.
2. H & C: Modern Electronic Instrumentation & Measurement Techniques by Albert D. Helfrick & William D. Cooper (PHI) Edition.
3. K: Electronic Instrumentation by H. S. Kalsi, 2nd Edition, Tata McGraw Hill.
4. T: Digital electronics by G. L. Tokheim (6th Edition) (Tata Mc Graw Hill).
5. H. Cooper, Modern electronic instrumentation and measurement techniques, Pearson Education (2015).
6. R.A. Witte, Electronic test instruments: Analog and digital measurements, Tata Mc Graw Hill (2004).

7. S. Wolf and R.F.M. Smith, Student Reference Manual for Electronic Instrumentation Laboratories, Pearson Education (2004).
8. David A. Bell, Electronic Instrumentation and Measurements, Prentice Hall of India, 2nd edition.

Suggestive readings

1. H & H: The Art of Electronics, by Paul Horowitz & Winfield Hill (2nd Edition).
2. U.A. Bakshi and A.V. Bakshi, Electronic Measurements and Instrumentation, Technical Publications.
3. Joseph J Carr, Elements of electronic instrumentation and measurement, Pearson Education (2005).
4. C.S. Rangan, G.R. Sarma and V.S. Mani, Instrumentation Devices and Systems, Tata McGraw Hill (1998).

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time

DISCIPLINE SPECIFIC ELECTIVE COURSE : VLSI Fabrication Technology (INDSE7D)

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
VLSI Fabrication Technology (INDSE7D)	04	03	-	01	Course admission eligibility	semiconductor devices

Learning Objectives

The Learning Objectives of this course are as follows:

- Understanding of Semiconductor Materials and Properties.
- Understanding of Cleanroom Practices and Safety Protocols.
- Understanding the principles of photolithography, Etching and Thin-Film Deposition.
- Analyze Ion Implantation and Annealing.
- Describe Oxidation and Annealing and explore Chemical Mechanical Polishing (CMP).