

UNDERGRADUATE PROGRAMME IN INSTRUMENTATION

ELI -5

Industrial Instrumentation

48 Periods

UNIT 1

Introduction, definitions and units, classification of flow meters, Mechanical type flowmeters - Theory of variable head type flow meters – orifice plate, venture tube, flow nozzle, Positive displacement flow meters – constructional details and theory of operation of nutating disc, reciprocation piston, oval gear– inferential meter – turbine flow meter – rotameter – thermal mass flow meter, Principle and constructional details of electromagnetic flow meter, different types of ultrasonic flow meters, laser Doppler anemometer systems – vortex shedding flow meter

11 Periods

UNIT 2

Measurement of Speed and Acceleration: Tachometers - Mechanical, Electric, Contact less, Frequency, Stroboscopic tachometers. Elementary accelerometers, Seismic, Practical accelerometers. Measurement of humidity and moisture–basic principles, hygrometers, psychrometers, humidity charts –dew point, measurement systems for humidity - Infrared moisture measuring systems, radioactive moisture measuring systems.

11 Periods

UNIT 3

Pressure measurement-Units of pressure – manometers – different types – elastic type pressure gauges – Bourdon type bellows – diaphragms –measurement of vacuum – McLeod gauge, Pirani and Ionization Gauge– thermal conductivity gauges – Ionization gauge cold cathode and hot cathode types – testing and calibration of pressure gauges – dead weight tester. Vacuum pumps- Rotary and Diffusion types.

15 Periods

UNIT 4

Recorders: strip chart, circular, X-Y, magnetic tape, printers-ink jet, laser.
Refrigeration: Refrigerants- Compressor, Evaporator, Condenser, Expansion Device

11 Periods

Essential Books:

UNIT 1

Chapter 13- A.K Sawhney, A course in mechanical measurements and instrumentation, Dhanpat Rai & Co.

Chapter 21- R.K. Jain, Mechanical and Industrial Measurements, Tenth Edition, Tata McGraw Hill

UNIT 2

Chapter 12, 15-A.K Sawhney, A course in mechanical measurements and instrumentation, Dhanpat Rai & Co.

Chapter 15, 17, 25 - R.K. Jain, Mechanical and Industrial Measurements, Tenth Edition, Tata McGraw Hill, New Delhi, 1996

UNDERGRADUATE PROGRAMME IN INSTRUMENTATION

UNIT 3

Chapter 9 - A.K Sawhney, A course in mechanical measurements and instrumentation, DhanpatRai&Co.

Chapter 15- D.S Mathur, Mechanics, S.Chand and Company Ltd.

UNIT 4

Chapter 7- A.K Sawhney, A course in mechanical measurements and instrumentation, DhanpatRai&Co.

Chapter 8,9,10,11, 12 -R. S. Khurmi and J. K. Gupta, A Text book of Refrigeration and Air conditioning, Eurasia Publishing House Pvt. Ltd.

Suggested Books:

1. Liptak B. G., Process Measurement and Analysis, Third Edition, Chilton Book Company, Pennsylvania, 1995.
2. D. Patranabis, Principles of Industrial Instrumentation, Tata McGraw Hill Publishing Co., New Delhi, 1995.
3. CSRangan and others, Instrumentation Devices and Systems, Second Edition, Tata McGraw Hill Education Pvt. Ltd.
4. Arun K. Ghosh, Introduction to Measurements and Instrumentation, Prentice Hall of India Pvt. Ltd.

Industrial Instrumentation (Practical based on ELI - 5)

(Any eight)

1. Discharge coefficient of orifice plate.
2. To study the calibration of pressure gauges using dead weight tester.
3. Calibration of thermocouple.
4. Calibration of RTD.
5. Level transmitters.
6. Conductivity meter calibration and measurements of conductivity of test solutions.
7. E.M. flowmeter.
8. Ultrasonic flowmeter.
9. Ratio control in combustion laboratory unit.
10. AC/DC meter calibrator.
11. Study of Circular chart recorder.