

CC – I : BASIC CONCEPTS OF INSTRUMENTATION

UNIT – I: BASIC PRINCIPLES OF MEASUREMENT

Aims of measurement - Classification of measurement Characteristics of measuring instruments, Primary sensing elements, Conversion elements, indicating and storing elements - Conversion elements, Indication and storing elements - Factors in the selection of measuring instruments - Static measurements - Scale and pointer type indicating instruments - The basic elements in measurements - Calibration procedure - Temperature problems - Intrinsic safety – Electrical noise and its elimination

UNIT – II: STANDARDS OF MEASUREMENTS AND THEORY OF ERRORS

Primary standards - Derived standards and units Standard samples - Radiation standard - Basic electrical standards - Derived electrical standards.

Errors - known errors - Gross error - Systematic error - Instrumental error – Environmental errors - Observational error - Random error - standard deviation – Variance - Gaussian curve of errors

UNIT - III : STATIC CHARACTERISTICS

Static calibration , accuracy, precision and bias - Combination of component errors in overall system - Accuracy calibration - Static sensitivity - Linearity - Threshold, resolution, hysteresis and dead space, scale reliability, span and static

Stiffness - Input Impedance, Impedance matching

UNIT - IV: DYNAMIC CHARACTERISTICS

Dynamic characteristics - Dynamic response of first order and second order type instruments - Dynamic accuracy - Response to a step function of function of displacement - Response to a constant velocity – response to a constant acceleration – Response to a sinusoidal input

UNIT - V: TRANSDUCERS

Analog transducers, Resistance, Inductive and Capacitive Transducers- Strain gauges – Opto electronic transducers – Digital transducers

BOOKS FOR STUDY AND REFERENCE

1. Measurement Systems - Application and Design Ernest O. Doebelin – McGraw Hill – International Edn- 1990
2. Mechanical and Industrial instruments – R.K. Jain - Khanna Publishers - Delhi – 1992
3. Instrumentation Devices and Systems - G.S. Rengan, G.R. Sarma and V.S.V. Mani - TMH - 1993