

Gautam Buddha University, Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
Integrated B. Tech. + M. Tech. / M.B.A.	Engg. Measurements & Instrumentation	ME 210	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
IV	2	2-0-0	3 Hours

Unit - I

Generalized Measurement Systems: Introduction; Description of stages in measurements; Types of input to measuring instruments and instrument system; Classification of measuring instruments; Types of error; Types of uncertainties; Propagation of uncertainties in compound quantity; Static performance parameters: Accuracy; Precision; Resolution; Static sensitivity; Linearity; Hysteresis; Dead band; Backlash and drift.; Sources of error; Selection of a measuring instruments; Mechanical and electrical loading; Fundamentals dynamic characteristics; Generalized mathematical model of measuring systems. **(06 Hours)**

Unit - II

Measurement of Mechanical Quantities: Force; Torque and pressure standards; Stresses and strains, Measuring methods; Comparative study of different types of forces and torque measuring systems; Description and working principle of different types of Transducers for measuring pressure; Measurements of high pressure and low pressure; Calibration method. **(05 Hours)**

Unit - III

Measurement of Flow: Introduction; Principle of operation of various obstruction meters for compressible and incompressible fluid flow measurement; Variable area meter and other important flow meters and visualization methods.

Measurement of Strain: Electric resistance strain gauges; Gauge construction and installation, Temperature compensation, Gauge sensitivities, Gauge factor,

Corrections for transverse strain effects, Factors affecting gauge relation, Rosettes, Potentiometer and Wheatstone's bridge circuits for strain measurements. **(06 Hours)**

Unit - IV

Measurement of Temperature: Measurements of low and medium temperatures pyrometers; Temperature indicators; Problems in temperature measurement.

Measurement of Humidity: Introduction; Different types of transducers for measurement of humidity; Their performance characteristics and limitations.

(05 Hours)

Unit - V

Measurement of Speed and Vibration: Velocity Acceleration; Speedometers; velocity measurement; Accelerometers; Encoders; calibration and uses; Different pick-ups and their limitations; Measurement of Radio-isotopes; Measurement of Radio activity.

(05 Hours)

Unit - VI

DAS and Signal Analysis: Data acquisition system via computers; The components of Data acquisition system; DAS Hardware; Selection criteria for choosing a DAS; Techniques for signal analysis.

(03 Hours)

Recommended Books:

1. Mechanical Measurement; Beckwith and Buck; Edn. 1965; Addison Wesley Publishing Co. Inc. London.
2. Measurement systems; Application and Design; E. Doebelin; Edn. 1976; Publisher Tata McGraw Hill.
3. Engineering Measurements and Instrumentation; L. F. Adams; Edition 1975; London English University Press.
4. Instrumentation Measurement and Analysis; B.C. Nakra; K.K. Choudhary; Edn. 1985; Publisher Tata McGraw Hill; New Delhi.
5. Automation; Production System & Computer Integrated Manufacturing by Mikell. P. Groover; 2nd edition 2001; Person Education Asia.
6. Instrumentation Devices and Systems; Rangan; Sharma; Tata McGraw Hill.
7. Data Acquisition & Signal Analysis; Beauchamp and George; Allen Yuen and Unwin Ltd.