Gautam Buddha University; Greater Noida

School of Engineering (Mechanical Engineering)

Degree	**Course Name**	**Course Code**	**Marks:100**
M. Tech. in Thermal Engg.	Experimental Methods in Thermal Engineering	MET 611	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
III	3	3-0-0	3 Hours

Unit - I

Importance of Experimental Investigation: Methodology; Error; accuracy; reproducibility and uncertainty; Systematic and random errors; Absolute and relative (percentage) errors–Error and propagation formulae; ASME recommended procedure for estimation of error and uncertainty. **(08 Hours)**

Unit - II

Review of Statistical Concepts: Random variable; Normal Distribution; mean & Variance; Point & Interval Estimation; Types of Estimators; Efficient; Unbiased & Maximum; Likelihood Estimates; Tests of Hypotheses; Design of Experiments; One way & Two way classification tests with & without interaction. **(08 Hours)**

Unit - III

Basics Concepts in Static and Dynamic Measurements: Calibration and standards; Generalized measurements Systems; Basic concepts in Dynamic Measurements; Performance characteristics of dynamic measurement; Data Acquisition systems. **(06 Hours)**

Unit - IV

Measurement of Thermal Properties: Pressure measurements; Manometers and electric pressure transducers; Temperature measurements; Thermocouple and its calibration; Resistance and radiation thermometer; Heat flux measurements; Nuclear and thermal radiation measurements; Examples. **(08 Hours)**

Unit - V

Measurement of Transport Properties: Velocity measurements; pitot tube; Thermal and Optical anemometers; Flow measurements; Flow obstruction methods and electric transducers for volumetric and mass flow rate measurements; Particle image velocimetry. **(07 Hours)**

Unit - VI

Measurements in RAC Systems: Hygrometry; electrical; psychometric and condensation methods; Duct sensor for relative humidity and temperature; thermostat; Frost potential thermostat; Air quality sensors; CO_2 sensor and leak detectors. **(08 Hours)**

Recommended Books:

1. The CRC Handbook of Thermal Engineering; Frank Kreith. CRC Press; 1st Edition; 2000.
2. Theory and Design for Mechanical Measurements; Richard S. Figliola and Donald E. Beasley; John Wiley & Sons; 3rd Edition; 2005.
3. Experimental Methods for Engineers; Jack Philip Holman; McGraw-Hill Series in Mechanical Engineering; 7th Edition; 2001.
4. Mechanical Measurements; T. G. Beckwith; R. D. Marangoni and J. H. Lienhard V; Pearson Education; 6th Edition; 2007.
5. A course in Mechanical Measurements and Instrumentation; A. K. Sawhney; Dhanpat Rai & Sons; 1st Edition; 2000.
6. Experimental and Uncertainty Analysis for Engineers; H.W. Coleman; W. G. Steele; John Wiley &sons; 2nd Ed.; 1999.