

Devi Ahilya University, Indore, India Institute of Engineering & Technology			
Subject code and name	Type	L-T-P	Credits
VLR8E3: Instrumentation and Experimental Techniques	L	T	P
	PE	3-1-1	4+1(P)

## COURSE CONTENTS

### Unit - 1

**Generalised Measurement Systems :** Purpose and methods of measurements, Generalised system of three stages, Calculation and sensitivity. Standards of measurements of various quantities. Legal Status of Standards.

Classification of first stage, Basic Detector - Sensor Element, Transducers and Devices, Mechanical and Electrical Members as a Primary Detectors, Advantages of Electrical - System Elements, Introduction of different types of Sensors.

### Unit - 2

**Statistical Treatment of Data :** Accuracy and Precisions, Reliability of Data. Classification of Errors – Systematic and Random Errors.

Treatment of Multi Sample Data. Mean, Mode and Medians as Measures of Central Tendancy. Standard Deviation and Normal Distribution. Error Estimates based on Normal Distribution. Confidence Limits. 2 -Tests.

### Unit - 3

**Measurement of Elastic Strains :** Mechanical, Optical, Acoustic, Pneumatic and Electrical Strain Measuring Devices, Electrical Resistance, Strain Gauges - Wire and Foil Type. Construction Application and their Characteristics. Potentiometric and Wheatstone Bridge Circuit and Modifying Devices. Strain Rossets. Analysis of Data.

### Unit - 4

**Introduction to Moire Fringe's Technique, Stress Analysis by Photoelasticity :** Optical Theory. Stress-Optic Relationship. Polariscopes and Photoelastic Materials. Determination of Isoclinics and Isochromatics, Separation Techniques and Fractional Fringe Order.

### Unit - 5

**Determination of Model Studies :** Models for Investigation and Verification. Design of Models, Principles of Similitude. Material Scale Factor, Load Scale Factor and Geometric Scale Factors. Correlation of Model Studies and Prototype Behaviour. Distribution. Analysis of Crack Pattern, Photoelastic Coating. Techniques to Elastic Strain Gauges.

### Books & References Recommended:

1. Jain R.K., Mechanical & Industrial Measurements

2. Dally & Riley, Experimental Stress Analysis.
3. Shrinath L.S., Experimental Analysis
4. Buck & Beckwith, Mechanical Measurements.
5. Sirohi & Radhakrishnan, Mechanical Measurements.
6. Dove & Adams, Experimental Stress Analysis.