

**0903 –DIPLOMA IN ELECTRONICS & COMMUNICATION**  
**SEMESTER -6**  
**090362 -INSTRUMENTATION**

**RATIONALE**

This subject deals with the various instruments, their construction and working which control the various parameters and operations in any industry. Electrical supervisor employed in maintenance of electrical equipment, machinery is required to diagnose faults, rectify them and test the total system for good performance. Thus there is a need of introducing diploma holders to the basics of Instrumentation.

**DETAILED CONTENTS**

**1. Measurements**

Importance of measurement, Basic measuring systems, advantages and limitations of each measuring systems, generalized measurement system, signal conditioning and display devices

**2. Transducers**

Theory, construction and use of various transducers (resistance inductance, capacitance, electromagnetic, piezo electric type)

**3. Measurements of Displacement and Strain**

Displacement Measuring Devices: wire wound potentiometer, LVDT, strain gauges, different strain gauges such as inductance type, resistive type, wire and foil etc. Gauge factor, gauge materials, and their selections, sources of errors and its compensations. Use of electrical strain gauges, strain gauge bridges and amplifiers.

**4. Force and Torque Measurement**

Different types of force measuring devices and their principles, load measurements by using elastic Transducers and electrical strain gauges. Load cells, proving rings. Measurements of torque by brake, dynamometer, electrical strain gauges, speed measurements; different methods, devices.

**5. Pressure Measurement**

Bourdon pressure gauges, electrical pressure pick ups and their principle, construction application and use of pressure cells.

**6. Flow Measurement**

Basic principles of magnetic and ultrasonic flow meters

**7. Measurement of Temperature**

Bimetallic thermometer, pressure thermometers, thermoelectric thermometers, resistance thermometer, thermocouple, thermistors and pyrometer, errors in temperature measurements in rapidly moving fluids. Temperature recorders

**8. Measurement of other non electrical quantities such as humidity, pH, level,**

## 9. Elements of telemetry and data acquisition system

### **INSTRUCTIONAL STRATEGY**

The teacher should explain the scope of various measuring devices and their practical application in the field. The transducers and measuring devices must be shown to the students and they should be trained in the selection, operation, maintenance and calibrations. Frequent visits to nearby process industries will be of immense help to the students

### **LIST OF PRACTICALS**

1. Measurement and plot of characteristics of optical devices like photodiodes, photocells
2. Characteristics of light operated switch using photo transistor and LDR
1. Measurement of strain using strain gauge
2. Measurement of pressure using pressure using pressure cell
3. Measurement of sound level using sound level meter
4. Measurement of temperature using thermistor and thermocopies
5. Measurement of load using load cell
6. Measurement of humidity using humidity meter
7. Measurement of linear and angular displacement
8. Measurement of flow rate using flow sensors
9. Measurement of angular distance using linear variable capacitor

### **RECOMMENDED BOOKS**

1. Electronic Measurement and Instrumentation by Dr Rajendra Prasad
2. Electrical and Electronics Measurement and Instrumentation by AK Sawhney, Dhanpat Rai and Co., New Delhi
3. Electronic Instrumentation and Measurement Techniques by WD Cooper, AD Helfrick Prentice Hall of India Pvt. Ltd. New Delhi
4. Electronics Tests and Measurement Techniques by Rajiv Sapra