MECHANICAL MEASUREMENTS

Course Code: 13ME1125

Course Educational Objectives:
To make the student to
❖ Impart the knowledge of basic engineering measurement systems for pressure, temperature, level, velocity, flow and vibration
❖ Introduce to electronic control systems associated with automatic control of measuring parameters.
❖ Apply the principles of measurement to engineering situations

Course Outcomes:
Student will be able to
❖ Identify appropriate instrument for measurement of specific parameter.
❖ Calibrate the instruments
❖ State the applications, important features and limitations of various measuring instruments

UNIT-I (12 Lectures)
INTRODUCTION:


UNIT-II (12 Lectures)
MEASUREMENT OF DISPLACEMENT:
Theory and construction of various transducers to measure displacement.
piezoelectric, inductive, capacitance, resistance, ionization and photovoltaic transducers, calibration procedures.

**MEASUREMENT OF TEMPERATURE:**
Classification, ranges, various principles of measurement, expansion, electrical resistance, thermistor, thermocouple, pyrometers, temperature indicators.

**UNIT-III**

**(12 Lectures)**

**MEASUREMENT OF PRESSURE:**
Units, classification, different principles used, manometers, piston, bourdon pressure gauges, bellows–diaphragm gauges. Low pressure measurement – thermal conductivity gauges – ionization pressure gauges, Mcleod pressure gauge, Knudsen gauge. Calibration of pressure gauges.

Measurement of level: Direct method – indirect methods—capacitive, ultrasonic, magnetic, cryogenic fuel level indicators – bubler level indicators.

**FLOW MEASUREMENT:**
Rotameter, magnetic, ultrasonic, turbine flow meter, hot–wire anemometer, laser Doppler anemometer (LDA).

**UNIT-IV**

**(12 Lectures)**

**MEASUREMENT OF SPEED:**
Mechanical tachometers, electrical tachometers, stroboscope, noncontact type of tachometer.

**MEASUREMENT OF VIBRATION:**
Different simple instruments, principles of seismic instruments – vibrometer and accelerometer using this principle.

**STRAIN MEASUREMENTS:**

**UNIT-V**

**(12 Lectures)**
Measurement of humidity - Moisture content of gases, sling psychrometer, absorption psychrometer, dew point meter.
ELEMENTS OF CONTROL SYSTEMS:
Introduction, importance – classification – open and closed systems servomechanisms–examples with block diagrams–temperature, speed & position control systems.

TEXT BOOK:

REFERENCES: