

Time allowed: 3 Hours

Max. Marks: 50

*NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit. Draw the diagrams wherever required.*

x-x-x

I. Answer the following:-

- a) Define the term 'instrument calibration.' Why is it important in instrumentation?
- b) Define Transducer? What are the various characteristics of a transducer?
- c) Write applications of Spectrum Analyzer.
- d) Discuss the various protection systems used in electrical circuits.
- e) Explain the working principle of a moving coil instrument. (5x2)

**UNIT - I**

II. Write notes on the following

- a) Series type Ohmmeters.
- b) Shunt type Ohmmeters. (5+5)

- III. a) Explain the working principle and construction of a Cathode Ray Oscilloscope (CRO). Discuss its main components, their functions, and how they work together to produce a visual display of electrical signals.
- b) How measurement of frequency is made with the help of a CRO? (6+4)

- IV. a) Discuss various Errors in Measurements, Provide practical examples from electrical and instrumentation systems where these errors can significantly impact the performance and reliability of measurements.
- b) Discuss how engineers can ensure the accuracy and reliability of their measurements in such systems. (5+5)

**UNIT - II**

- V. a) Discuss the role of LabVIEW or other graphical programming environments in virtual instrumentation, detailing how they provide an intuitive interface for data acquisition, signal processing, and system control. Also, explain how virtual instrumentation can be applied in industries such as telecommunications, manufacturing, and medical diagnostics.
- b) Explain local and global variable with an example. (7+3)

- VI. a) Explain the working of LVDT in detail.
- b) An AC LVDT has the following data: Input=6.3V, output=5.2V, range  $\pm 0.5$ in. Determine (i) The output voltage vs core position for a core movement going from +0.45in to -0.30in (ii) The output voltage when the core is -0.25in from the centre. (5+5)

- VII. a) Discuss the operation of a thermocouple as a temperature sensor. Explain the Seebeck effect and how the voltage generated is related to temperature. Also, describe the types of thermocouples, their material compositions, and their applications in industrial instrumentation..
- b) How cardiovascular measurements are made by use of sensors. (7+3)

x-x-x