

R18

Code No: 158DP

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year II Semester Examinations, June - 2024

MEASURING INSTRUMENTS

(Common to CE, EEE, ME, EIE)

Time: 3 Hours

Max. Marks: 75

- Note:** i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

- 1.a) What is the significance of accurate measurements in science and engineering? [2]
- b) What is the probability of errors in measurements, and how is it calculated? [3]
- c) Differentiate between a Positive Temperature Coefficient (PTC) and a Negative Temperature Coefficient (NTC) thermistor. [2]
- d) What is a resistive hygrometer and how does it measure humidity? [3]
- e) What is the principle of operation of an optical interferometer for length measurements? [2]
- f) Define plainness in the context of metrology. How is it different from flatness? [3]
- g) What is a force-balance transducer, and how is it used for pressure measurement? [2]
- h) What is a U-tube manometer, and how does it work? [3]
- i) What is the principle behind the strain gauge load cell method? [2]
- j) Define industrial consistency and why it is important in manufacturing processes. [3]

PART – B

(50 Marks)

- 2.a) Define a standard unit of measurement and explain its role in establishing a uniform system of measurement.
- b) Discuss the difference between precision and accuracy in the context of physical measurements. Provide examples to illustrate the concept of precision and accuracy in measurements. [5+5]

OR

- 3.a) Describe the characteristics and usage of voltage standards in calibration of laboratories. Discuss the role of voltage references in maintaining the accuracy of electrical measurements.
- b) Differentiate between primary standards and secondary standards in the context of measurement units. Provide examples of primary and secondary standards for common physical quantities. [5+5]

- 4.a) Explain the principle of operation of a Potentiometer.
b) Describe the structure and working principle of an LDR. [5+5]
- OR**
- 5.a) Explain the Wheatstone bridge configuration and its use in measuring strain.
b) Discuss the types of resistive hygrometers and their operating principles. [5+5]
- 6.a) Describe the principle of operation of a vernier caliper. How does it achieve higher precision than a simple ruler?
b) Discuss the principle of operation of a stroboscope and how it produces the illusion of slow motion. [5+5]
- OR**
- 7.a) Discuss the instruments and techniques used for measuring surface roughness, such as profilometers and roughness comparators.
b) Explain how a goniometer is used to measure angles with higher accuracy. Discuss its construction and working principle. [5+5]
- 8.a) Explain the principle of gyroscopic force measurement. How does it utilize the angular momentum of a spinning gyroscope?
b) Discuss the construction and working principle of a Bourdon tube manometer and its applications in pressure measurement. [5+5]
- OR**
- 9.a) Explain the units of pressure measurement and the conversion between different pressure units.
b) Describe the principle of operation of a diaphragm pressure sensor and its suitability for low-pressure measurement. [5+5]
- 10.a) Describe the working principle of head-type flow meters. Provide an example of their application.
b) Explain the principle of operation of a two-float viscometer for viscosity measurement. [5+5]
- OR**
- 11.a) Describe the principle behind density measurement using the buoyancy method. What are the factors that affect the accuracy of this method?
b) Discuss the principle of operation of an industrial consistency meter. [5+5]

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