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Question Paper Code : 81284

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2025.

Fourth Semester

Electrical and Electronics Engineering

EE 3403 — MEASUREMENTS AND INSTRUMENTATION

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Classify the analog instruments with one example each.
2. Define the terms : Accuracy and Precision.
3. What is called creeping in energy meters? Why it occurs?
4. What is the use of Megger?
5. Write the two conditions to be satisfied for balancing AC bridges.
6. What type of AC bridge is used for measurement of capacitance and write its mathematical expressions.
7. What type of transducers is used for measurement of pressure?
8. Write the salient features of smart sensors.
9. What are the uses of data loggers?
10. What is called virtual instrumentation?

PART B — ($5 \times 13 = 65$ marks)

11. (a) Draw the functional block diagram of an Instrumentation system and explain their functions of each element.

Or

- (b) A circuit was tuned for resonance by eight different students, and the values of resonant frequency in kHz were recorded as 532, 548, 543, 535, 546, 531, 543 and 536. Calculate (i) the arithmetic mean, (ii) deviation from the mean, (iii) average deviation, and (iv) standard deviation.

12. (a) Describe the construction and working of Permanent Magnet Moving Coil (PMMC) instrument. Also derive the expression for deflection if the instrument is spring controlled.

Or

- (b) Explain the constructional details of an Electrodynamometer type wattmeter. Derive the torque equation and comment the shape of scale if the spring control is used.
13. (a) Why Wheatstone bridge is not suitable for low resistance measurement? List out the modifications made in Kelvin's double bridge for measuring low resistance. Explain its operation with circuit diagram.

Or

- (b) Identify the different sources of errors in AC bridges? Explain the precautions taken and the techniques used for elimination of these errors.
14. (a) Classify the transducers with its definition and suitable examples. Write short notes on thermistor used for temperature measurement.

Or

- (b) Explain the operation of Electromagnetic type flow meter used for measurement of fluid flow. Compare the operation of Electrometric type flow meter when it is excited by AC and DC.
15. (a) List out the different types of analog to digital converters. Explain the type of analog to digital converter used for digital voltmeter.

Or

- (b) Draw the functional block diagram of Digital Storage Oscilloscope (DSO) and explain the functions of main elements in DSO.

PART C — (1 × 15 = 15 marks)

16. (a) A coil has 10 mH inductance with quality factor of 100. Choose the type of AC bridge used for measurement of the coil inductance. Draw its bridge circuit diagram and derive the mathematical expression for unknown inductance with phasor diagram.

Or

- (b) Develop the connection diagram with the instruments used for measurement of voltage and current in the three phase AC system in the industry with 11 kV supply and 500A load. Select the suitable instruments and explain its operation.