Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 51012

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

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 × 2 = 20 marks)

1. Classify the analog Instruments based on operating principle.

2. How do you define the terms Accuracy and Precision?

3. Distinguish between moving iron type instrument and moving coil type instrument.

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 writes its formula.

7. Write any two methods used for measurement of temperature.

8. Mention the advantages of digital transducers.

9. List out the types of analog to digital converters.

10. What is called Virtual instrumentation?

PART B — (5 × 13 = 65 marks)

11. (a) List out the functional elements of a generalized Instrumentation System. Draw the functional block diagram of an Instrumentation system and explain their functions.

Or

(b) Define and explain the following terms.

(i) Speed of response (5)

(ii) Measuring lag (4)

(iii) Fidelity and dynamic error (4)

12. (a) Describe the working principle of repulsion type moving iron instruments. Derive the expression for deflection if spring control is used.

Or

(b) Describe the constructional details and operation of a single phase induction type energy meter.

13. (a) Construct the Wien Bridge and explain its operation with bridge balance equations.

Or

(b) Draw the circuit for Instrumentation Amplifier and explain its operation with voltage expression.

14. (a) Explain how are the magnitude and direction of the displacement detected in linear voltage differential transformer (LVDT).

Or

(b) What is called Smart Sensor? Mention its salient features. Explain its operation with its functional block diagram.

15. (a) Explain the principle, how frequency of AC signals can be measured using the digital instrument.

Or

(b) Draw the functional block diagram of Digital Storage Oscilloscope and describe its operation.

PART C — (1 × 15 = 15 marks)

16. (a) 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, (4)

(ii) Deviation from the mean, (4)

(iii) Average deviation, and (4)

(iv) Standard deviation. (3)

Or

(b) Identify the different sources of errors in AC bridges? Explain the precautions taken and the techniques used for elimination of these errors.