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Question Paper Code : 20979

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

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. How are measuring instruments classified?
2. List the various errors that are observed in measurements.
3. Compare moving coil and moving iron instruments.
4. What is meant by instrument transformers?
5. List the various errors observed in A.C. bridges.
6. Give the role of instrumentation amplifiers.
7. Define transducer.
8. What are the advantages of smart sensors?
9. Define data loggers.
10. List the various advantages of virtual instrumentation.

PART B — (5 × 13 = 65 marks)

11. (a) With aid of block diagram showing the basic functional elements of an General instrument and explain the functions of each block with example.

Or

- (b) Describe in detail the different types of dynamic errors in a measurement system.

12. (a) Explain the principle construction and working of single phase induction type energy meter also list its merits and demerits.

Or

- (b) Explain with neat diagram about the principle construction and working of repulsive type moving iron instrument and also discuss its merits and demerits.

13. (a) Explain the operation of wheatstone bridge with neat circuit diagram and also derive the expression for determining unknown resistance.

Or

- (b) Explain how inductance is measured in terms of known capacitance using Maxwell's bridge and also derive the equation for balance condition.

14. (a) With a suitable transducer explain the measurement of

(i) Pressure (6)

(ii) Temperature (7)

Or

- (b) Explain the basic building blocks of smart sensor and compare it with conventional sensors.

15. (a) With neat diagram explain the working of successive approximation type ADC with suitable example.

Or

- (b) Explain the working of weighted resistor type DAC with neat circuit diagram.

PART C — (1 × 15 = 15 marks)

16. (a) Write the ladder logic program of PLC for following applications

(i) AND gate, OR gate (8)

(ii) A timer circuit to switch off bulb after 10 min from its switch ON time. (7)

Or

(b) A set of independent current measurements were taken by six observers and were recorded as 12.8 A, 122 A, 12.5 A, 13.1 A, 12.9 A, and 12.4 A. Calculate (i) the arithmetic mean, (ii) the deviations from the mean (iii) the average deviation, (iv) the standard deviation, and (v) variance.
