Question Paper Code : 30152

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 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. Write two applications for smart sensors

2. The number of pulses counted by a digital frequency meter is 4 for a gating signal duration of 10 ms. Compute the unknown frequency.

3. How could one overcome gross errors while making measurements?

4. A voltmeter read as follows: 112.5, 112.0, 112.2, 112.3 and 112.4. If the actual reading is 112.1V, find the random error.

5. Write the expressions for the deflecting and controlling torques in a moving coil meter, defining each symbol in it.

6. Why is a moving iron device not suited for measuring direct voltages and currents?

7. Write any two limitations of wheat stone bridge.

8. 12V dc was input to a wheat stone bridge. The ratio arm impedances were 400 Ω and 200 Ω. A 560 Ω standard resistor was connected in the third arm. Find the magnitude of resistance in the unknown arm.

9. Draw the circuit of a LVDT device.

10. Define a virtual instrument.

PART B — (5 × 13 = 65 marks)

11. (a) Draw the block diagram of a measurement system and explain about each functional element in it.

Or

(b) Explain in detail about instrumental errors, their classification and remedial step taken in the case of occurrence of such errors.

12. (a) With neat diagrams, explain the working of dynamometer wattmeter and write the expression for average deflecting torque while measuring ac power.

Or

(b) Explain the construction and principle of working of induction type wattmeter.

13. (a) Derive the expression for unknown inductance using Maxwell's bridge.

Or

(b) State the conditions for an ac bridge to be balanced. Draw the circuit diagram of a schering's bridge and derive the expressions for the unknown quantities.

14. (a) Explain why the ac tachometer deviates from linearity characteristics at high speeds.

Or

(b) With a circuit explain the working of a thermistor and explain why it is not suited at high temperatures.

15. (a) Draw the block diagram of a DSO and explain the working. Compare between ASO and DSO performance.

Or

(b) Explain four important features of virtual instrumentation.

PART C — (1 × 15 = 15 marks)

16. (a) Design a R-2R converter circuit by assuming suitable specifications.

Or

(b) An ac bridge has the following constants : arm AB, R=1K Ω in parallel with C=0.159 μf; BC, R = 1 K Ω, CD, R = 500 Ω; DA, C = 0.636 μf in series with an unknown resistance. Find the frequency for which this bridge is balanced and determine the value of resistance in arm DA to produce this balance.