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Question Paper Code : 20457

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Fourth Semester

Electrical and Electronics Engineering

EE 6404 — MEASUREMENTS AND INSTRUMENTATION

(Common to PTEE 6404 – Measurements and Instrumentation for B.E. (Part-Time) – Second Semester – Electrical and Electronics Engineering – Regulation 2014)

(Regulations 2013)

Time : 3 hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. The measured value of a capacitor is 205.3 μF, where as its true value is 201.4 v μF. Determine the relative error.

2. What is meant by calibration?

3. Mention the types of analog ammeters.

4. A meter with constant 750 revolutions per kWh makes 15 revolutions in 30 seconds. Determine the load in kW.

5. Mention the difference between DC and AC potentiometer.

6. Identify the detectors used in AC bridges.

7. Write the broad classification of recorders.

8. Compare the merits and limitations of LED and LCD.

9. What is a transducer?

10. A piezo-electric crystal has a thickness of 2.5 mm and a voltage sensitivity of 0.05 Vm/N. Determine the output voltage when it is subjected to a pressure of 1.6×10^6 N/m².

PART B — (5 × 13 = 65 marks)

11. (a) (i) Define any three parameters of the static characteristics of instruments. (6)

    (ii) What are the main elements of a measuring system? Explain these elements with the help of a block diagram of an instrumentation system. (7)

Or

   (b) (i) Mention the types of errors in measurement. Explain the causes and remedies for the errors. (6)

    (ii) A set of independent 10 measurements were made to determine the weight of a lead shot. The weights in gram were: 1.570, 1.597, 1.591, 1.562, 1.577, 1.580, 1.564, 1.586, 1.550 and 1.575. Determine the arithmetic mean, average deviation, standard deviation, variance, and probable error of the mean. (7)

12. (a) (i) Describe the Construction and working principle of any one type of frequency meter. (6)

    (ii) What is the need of instrument transformer? Explain the construction of current transformer. (7)

Or

   (b) (i) Describe the construction and working principle of single phase energy meter. (6)

    (ii) Explain the measurement of iron losses by ac potentiometer. (7)

13. (a) (i) With a neat diagram explain the working of transformer ratio bridge. (6)

    (ii) Explain any one bridge used for inductance measurement. (7)

Or

   (b) (i) What is the need for grounding? Explain any one grounding technique in detail. (6)

    (ii) Explain the construction and working of any one self balancing bridge. (7)

14. (a) Explain the basic components of a magnetic tape recorder and describe recording technique used. (13)

Or

   (b) Explain the blocks and operation of Digital CRO in detail. (13)

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15. (a) With a neat block diagram, explain the digital data acquisition system. (13)

Or

(b) (i) Explain the working of piezoelectric transducer. (6)

(ii) Identify any two digital transducers and list the merits of the same compared to analog transducer. (7)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Describe the circuit of any one bridge used for measurement of low resistance. (8)

(ii) Discuss the impact of electrostatic and electromagnetic interference. (7)

Or

(b) (i) Discuss how the digital to analog conversion takes place using any one type of D/A converter with one numerical example. (8)

(ii) Give two examples for resistive, capacitive and inductive transducers. (7)