Reg. No. :

Question Paper Code: 41435

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2016

Fourth Semester

Electrical and Electronics Engineering

14UEE405 - ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

(Regulation 2014)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The span of a zero-centered voltmeter having a scale from -10 *V* to +10 *V* is _____

    (a) 0 *V*   (b) -10 *V*   (c) 10 *V*   (d) 20 *V*

2. A 0-150 *V* voltmeter has an accuracy of 1% of full scale reading. The voltmeter measured by this instrument is 75 *V*. The limiting error is _____

    (a) 1 %   (b) 2 %   (c) 2.5 %   (d) 3 %

3. Which one of the following decides the time response of an indicate instrument?

    (a) Deflecting system   (b) Controlling system
    (c) Damping system   (d) Pivot and jewel bearings

4. A moving coil galvanometer is made into a dc ammeter by connecting _____

    (a) A low resistance across the meter
    (b) A high resistance in series with the meter
    (c) A pure inductor across the meter
    (d) A capacitor in series with the meter

5. The primary current in a CT is dictated by _____

    (a) The secondary burden   (b) The core of the transformer

    (c) The load current   (d) None of the above

6. The voltage coil of a single phase house energy meter _____

    (a) Is highly resistive

    (b) Is highly inductive

    (c) Is highly capacitive

    (d) Has a phase angle equal to load power factor angle

7. Lissajous pattern obtained on the screen of a CRO can be used to determine_____

    (a) Phase shift   (b) Amplitude distortion

    (c) Voltage amplitude   (d) None of the above

8. The recording head in a magnetic tape responds to _____

    (a) Electrical signal and creates a magnetic signal

    (b) Thermal signal and creates a magnetic signal

    (c) Magnetic signal and creates an electrical signal

    (d) Thermal signal and creates an electrical signal

9. Which of the following is a passive transducer?

    (a) Piezoelectric   (b) Thermocouple

    (c) Photovoltaic cell   (d) LVDT

10. What is a reading of 0.5245 on 1 *V* range in four and a half digit voltmeter displayed as

    (a) 0.5245   (b) 00.524   (c) 000.52   (d) 0000.5

PART - B (5 x 2 = 10 Marks)

11. Mention the basic significance of measurement.

12. Which torque is absent in a energy meter? Why?

13. What is the standardization of potentiometer?

14. Name three methods of magnetic tape recording.

15. What is piezoelectric effect?

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PART - C (5 x 16 = 80 Marks)

16. (a) Show the functional blocks of a generalized instrumentation system through a neat sketch. Also explain their functions with any one example in detail. (16)

Or

(b) (i) Explain different types of standards. (8)

(ii) In a survey of ten owners of certain model of car the following figures for average petrol consumption were reported: 29.2, 30.4, 32.4, 28.9, 30, 33.3, 31.4, 29.5, 30.5, 31.7, 33 and 29.2. Calculate

(1) mean value (2) median value and (3) standard deviation. (8)

17. (a) (i) Derive the construction and working of PMMC instrument and also derive its torque equation. (8)

(ii) Write short note on any two adjustments required in energy meters. (8)

Or

(b) (i) With neat diagram explain the working principle of successive approximation type of digital voltmeter. (8)

(ii) Describe the construction and functioning of electrical resonance frequency meter. (8)

18. (a) (i) How to measure the unknown resistance value using potentiometer. (8)

(ii) Derive the bridge balance condition for the Maxwell's bridge. (8)

Or

(b) (i) An Anderson ac bridge is as follows:

Arm AB : unknown inductance Rx and Lx

Arm AB : non inductive resistance $R2 = 1000\Omega$

Arm CD : non inductive resistance $R4 = 1000\Omega$

Arm DA : non inductive resistance $R3 = 500\Omega$

Arm DE : non inductive resistance $r = 100\Omega$

Arm EB : detector and AC supply between AC

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Arm *EC*: capacitance $C = 3\mu F$, state expressions for *Lx* and *Rx*. Find the value of them for given values of elements. (8)

(ii) Mention the importance of grounding. Explain the grounding techniques in detail to reduce the grounding loop interference signal. (8)

19. (a) Explain the principle of working of a X-Y recorder with neat diagram. Also mention some example. (16)

Or

(b) (i) Explain the working principle of CRT. (10)

(ii) Explain the digital storage oscilloscope with neat diagram. (6)

20. (a) (i) Design a 4 bit R-2R ladder DAC and also draw the equivalent circuit diagram. (8)

(ii) Describe the selection criteria for the transducer. (8)

Or

(b) (i) With neat diagram explain the working principle of Resistance Temperature Detector (RTD). (8)

(ii) Describe the principle of operation of LVDT and its characteristics. (8)

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