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Question Paper Code: 44305

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

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. The ratio of maximum displacement deviation to the full scale deviation of the instrument is called
(a) Static sensitivity (b) Accuracy (c) Linearity (d) Precision
3. PMMC instrument gives uniform scale because
(a) It uses spring control
(b) It uses eddy current damping
(c) The deflection torque is proportional to the instrument current
(d) Both (a) and (c)
4. The Sensitivity of a Multimeter which has full deflection current of $1 mA$ is
(a) $100 \Omega / V$ (b) $1000 \Omega / V$ (c) $10 \Omega / V$ (d) $1 \Omega / V$

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. Maxwell's bridge is used to measure Q factor in the range
 - (a) 1-10
 - (b) 30-50
 - (c) 50-75
 - (d) 75-100
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. A Recorder is an instrument used for
 - (a) Recording
 - (b) Indicating
 - (c) Display
 - (d) Measurement
9. The strain gauge is an example of _____ transducer.
 - (a) Active
 - (b) Passive
 - (c) Capacitive
 - (d) Inductive
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. Illustrate the difference between accuracy and precision.
12. Define creeping in energy meter. How it is prevented?
13. What is called a volt-ratio box?
14. List the components of a magnetic tape recorder.
15. Mention any four types of analog to digital converter.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Describe the functional elements of measurement system with neat diagram. (8)

(ii) The Expected value of the current through a resistor is 20 mA . However the measurement yields a current value of 18 mA . Calculate

- (i) absolute error (ii) % error
(iii) relative accuracy (iv) % accuracy. (8)

Or

(b) (i) Discuss the various dynamic characteristics of an instrument in detail. (8)

(ii) A voltmeter reading 70V on its 100V range and an ammeter reading 80 mA on its 150 mA range are used to determine the power dissipated in a resistor. Both these instruments are guaranteed to be accurate within $+ \text{ or } - 1.5\%$ at full scale deflection. Determine the limiting error of the power. (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) Describe the circuit of Kelvin double bridge used for measurement of low resistance. (16)

Or

(b) (i) Analyze with a diagram how Schering's bridge can be used to measure unknown capacitance. (10)

(ii) Discuss about the Wagner's ground connection. (6)

19. (a) (i) Explain the working principle of CRT. (10)
(ii) Explain the digital storage oscilloscope with neat diagram. (6)

Or

- (b) (i) Analyze the operation of a storage CRO using the necessary diagrams. (10)
(ii) Discuss about the dot matrix display in detail. (6)
20. (a) Explain the construction and working principle of Linear Variable Differential Transducer(LVDT). (16)

Or

- (b) (i) Explain in detail about the various elements of data acquisition system with necessary block diagram. (10)
(ii) For a 5 bit ladder, if the input levels are $0 = 0\text{ V}$ and $1 = +10\text{ V}$. What are the output voltages for each bit? (6)