Question Paper Code: 41345

B.E. / B.Tech. DEGREE EXAMINATION, NOV 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. The Instrument that can measure both power as well as energy is

- (a) Voltmeter(b) Multimeter(c) Trivector Meter(d) None of these
- 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. 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. 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. Define the term "Gross error".
- 12. State the advantages of a DVM over an analog meter.
- 13. What is the standardization of potentiometer?
- 14. Name three methods of magnetic tape recording.
- 15. A resistance strain gauge with a gauge factor of 2 is cemented to a steel member, which is subjected to a strain of 1×10^{-6} . If the original resistance value of the gauge is 130Ω , calculate the change in resistance.

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)

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.
 - (ii) Describe the construction and functioning of electrical resonance frequency meter. (8)
- 18. (a) (i) Analyze with a diagram how Maxwell's bridge can be used to measure unknown inductance. (10)
 - (ii) Discuss about the limitations and applications of wheatstone bridge. (6)

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) 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) Analyze in detail about the working principle of Piezo-electric transducers. (10)

(ii) A variable reluctance type inductive transducer has a coil of inductance of $2500 \ \mu H$. When the target made of ferromagnetic material is 1mm away from the core. Calculate the value of inductance when a displacement of 0.04 *mm* is applied to the target in a direction moving it towards the core. (6)

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 V and 1 = +10 V. What are the output voltages for each bit? (6)