

**B.E DEGREE EXAMINATIONS: MAY/JUNE 2013**

Fourth Semester

**ELECTRONICS AND COMMUNICATION ENGINEERING**

ECE109: Measurements and Instrumentation

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions**

**PART A (10 x 1 = 10 Marks)**

1. A multimeter is used to measure a resistance of 1, 384, 572  $\Omega$ . The best precise indication of the above reading is
  - a) 1385  $\Omega$
  - b) 1.4M  $\Omega$
  - c) 1.39 M  $\Omega$
  - d) 1.385 M  $\Omega$
2. One of the following bridges could be used in Harmonic Distortion Analyser -
  - a) Schering Bridge
  - b) Wien Bridge
  - c) Wheatstone Bridge
  - d) Hay Bridge
3. The horizontal section of an Oscilloscope is also called as
  - a) Oscillator
  - b) EHT
  - c) Time-base
  - d) Retrace
4. Q, the quality factor is defined as
  - a)  $X_L/X_C$
  - b)  $R/Z$
  - c)  $X_C/X_L$
  - d)  $X_L/R$
5. A Spectrum analyzer gives the trace of
  - a) Amplitude Vs Time
  - b) Amplitude Vs Frequency
  - c) Power Vs Time
  - d) Power Vs Frequency
6. The relationship between voltage and frequency in an oscillator is non-linear. The circuit used to correct the same is
  - a) Time-base
  - b) Attenuator
  - c) Linearizer
  - d) Regulator
7. A digital display has 4 digits. If the maximum value that could be displayed by MSD is 1. The maximum value that could be displayed is
  - a) 1111
  - b) 1888
  - c) 1999
  - d) 9999
8. The most important element that is used by true-rms type meter is
  - a) Diode
  - b) Thermocouple
  - c) Thermistor
  - d) Capacitor

9. One of the following is not a handshake signal in IEEE-488 standard -
- |        |         |
|--------|---------|
| a) IFC | b) NRFD |
| c) DAV | d) NDAC |
10. The unit of power as displayed in Optical measurements is usually is in
- |        |       |
|--------|-------|
| a) kW  | b) W  |
| c) dBm | d) mW |

**PART B (10 x 2 = 20 Marks)**

11. A 0-50 V voltmeter has a guaranteed accuracy of 1% of full scale reading. The meter indicates a voltage reading of 35 V. Calculate the limiting error in percentage. Also, state the possible range of the reading.
12. State the conditions for balance for AC bridges.
13. What are the different types of Oscilloscopes? List any two.
14. What are the parameters that are measured by Vector Impedance meter?
15. Compare Function Generator with that of Oscillator with respect to their outputs.
16. Define harmonic distortion.
17. What are the various components present in an electronic multimeter?
18. What are the various errors that occur in Time/Frequency measurements?
19. How are instruments generally classified in IEEE-488 standard?
20. What is the important role played by ADC in a data acquisition system?

**PART C (5 x 14 = 70 Marks)**

21. a) (i) A basic d'Arsonval movement has an internal resistance  $R_m = 50 \Omega$  and FSD current of 1 mA. Compute the values of shunt resistors required to convert the basic movement into an Ammeter to measure 1 A and 10 A current ranges. (10)
- (ii) What are the types of errors that are encountered in measurements? Explain and also discuss methods to minimize them. (4)
- (OR)**
- b) (i) A basic d'Arsonval movement has an internal resistance  $R_m = 100 \Omega$  and FSD current of 1 mA. This basic movement is to be converted into a Voltmeter to measure ranges of 0 – 10 V, 0 – 50 V and 0 – 250 V. Calculate the value of series resistors required. (10)
- (ii) What are fundamental and derived units? Explain with examples. (4)
22. a) (i) What are the advantages of digital storage oscilloscopes over analog storage (4)

oscilloscopes? Explain.

- (ii) Describe the working of a digital storage oscilloscope with a neat block diagram. (10)

**(OR)**

- b) (i) What are the characteristic features of RF power meters? Also, detail the importance of RF probes. (6)

- (ii) What are the parameters that could be measured using a general purpose oscilloscope? Explain with simple schematics. (8)

23. a) Describe the working of a typical general purpose pulse generator with a neat block diagram.

**(OR)**

- b) Describe the working of a frequency synthesized signal generator with a neat block diagram.

24. a) (i) Illustrate how the frequency range of a counter could be extended. Use simple block schematics to explain. (8)

- (ii) Explain how time-base errors are minimized and stability maintained in frequency measurements. (6)

**(OR)**

- b) (i) What are the general characteristics of a digital voltmeter? Describe in brief. (4)

- (ii) Describe the working of ramp-type digital voltmeter with a neat block diagram. (10)

25. a) What are the elements that comprise a digital data acquisition system? Explain the role of each. Draw a simple block diagram.

**(OR)**

- b) Discuss the salient features of IEEE-488 interface standard.

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