

Code: AE12

Subject: INSTRUMENTATION AND MEASUREMENT

**AMIETE – ET (OLD SCHEME)**

Time: 3 Hours

**DECEMBER 2011**

Max. Marks: 100

**NOTE: There are 9 Questions in all.**

- Please write your Roll No. at the space provided on each page immediately after receiving the Question Paper.
- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

**Q.1 Choose the correct or the best alternative in the following: (2×10)**

- a. Subtracting  $437 \pm 4$  from  $462 \pm 4$  has result with percentage error of
- (A)  $\pm 4\%$  (B)  $\pm 16\%$   
(C)  $\pm 8\%$  (D)  $\pm 32\%$
- b. Precision measurement of resistance is generally carried out by
- (A) Potentiometer method (B) CRO method  
(C) Bridge method (D) Voltmeter-Ammeter method
- c. Two AC signals have been applied at X and Y inputs of CRO. Phase difference between two signals is  $90^\circ$ . The resulting pattern will be
- (A) An ellipse (B) A circle  
(C) Butterfly (D) Parabola
- d. The Reed frequency meter is a
- (A) Recording instrument (B) Deflecting instrument  
(C) Vibrational instrument (D) None of the above
- e. To measure harmonics in an emf wave form
- (A) resonance effect can be used (B) hall effect can be used  
(C) Both (A) & (B) (D) None of above
- f. LVDT converts
- (A) Linear motion into electrical signal  
(B) Temperature into electrical signal  
(C) Circular motion into electrical signal  
(D) None of the above

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- g. Which type of oscillator is most suitable for calibration of communication receivers
- (A) L – C oscillators                      (B) Crystal oscillator  
(C) R – C oscillators                      (D) VCO
- h. Which of the following is not a part of Time period counter
- (A) Time Base                                  (B) Memory  
(C) Decade counter                          (D) A/D converter
- i. Spatial encoder translates
- (A) angular position into binary number.  
(B) angular position into electric signal.  
(C) linear motion into binary number.  
(D) linear motion into electric signal.
- j. Geometric mean of 64 MHz to 128 MHz frequency range is
- (A) 64 MHz                                      (B) 128 MHz  
(C) 90.5 MHz                                  (D) 96 MHz

**Answer any FIVE Questions out of EIGHT Questions.  
Each question carries 16 marks.**

- Q.2** a. Define various dynamic performance characteristics related to measuring instruments. (8)
- b. Write short note on (8)
- (i) Time base error                      (ii) Extending frequency range of counter.
- Q.3** a. Discuss features of general purpose multimeter and write its advantages & applications. (8)
- b. Consider ac bridge shown in Fig.1 which has
- In arm AB -  $450\Omega$  Resistor  
arm BC -  $300\Omega$  Resistor in series with  $0.265\mu\text{F}$  capacitor  
In arm CD – unknown constants and  
arm DA  $\rightarrow 200\Omega$  Resistor in series with  $15.9\text{mH}$  Inductor.  
Find the constants of arm CD if oscillator frequency is  $1\text{KHz}$  and bridge is balance. (8)

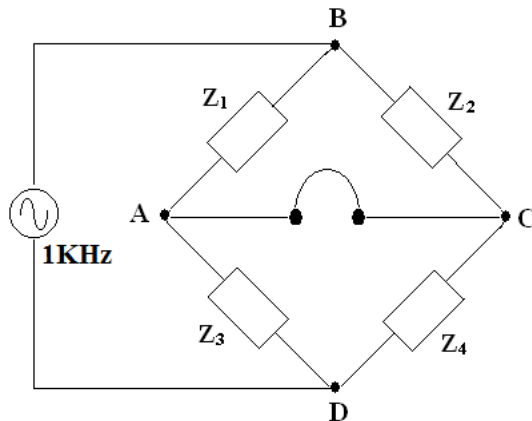


Fig. 1

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- Q.4** a. Describe working of frequency-synthesized signal generator with the help of block diagram. (8)
- b. Draw block schematic of a frequency counter and discuss its operation. (8)
- Q.5** a. Draw block diagram of CRO and discuss function of CRT. (8)
- b. Discuss features of storage oscilloscope. What are the additional features in sampling oscilloscope? (8)
- Q.6** a. What are Ferromagnetic materials? Draw hysteresis loop for soft magnetic materials. How it is obtained? (8)
- b. How RF power measurement is different from normal frequency power measurement? Write any one method to determine RF power. (8)
- Q.7** Explain the following:
- (i) Selectivity measurement by sweep method.
- (ii) Dual sweep alignment of receivers. (16)
- Q.8** Write working principle and applications of the following:
- (i) Resistive Transducer.
- (ii) Capacitive transducer
- (iii) Photoelectric transducer
- (iv) Electromechanical Transducer. (16)
- Q.9** Discuss the following:
- (i) Counter type A/D converter
- (ii) Harmonic Distortion Analyzer. (16)