

**Subject: ELECTRONIC INSTRUMENTATION
AND MEASUREMENT****Time: 3 Hours****JUNE 2011****Max. Marks: 100****NOTE: There are 9 Questions in all.**

- 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. In terms of three fundamental quantities power may be represented as _____

(A) MLT^{-2}

(B) ML^2T^2

(C) ML^2T^{-3}

(D) $ML^{-1}T^{-1}$

b. In measurement, which of the following characteristic(s) is/are desired _____

(A) accuracy

(B) sensitivity

(C) reproducibility

(D) all the above

c. The voltage of a circuit is measured by a voltmeter, having input impedance comparable with the output impedance of the circuit, thereby causing an error in voltage measurement. This error can be called as _____

(A) gross error.

(B) systematic error.

(C) error caused by misuse of instrument.

(D) error caused by loading effect.

d. The base of SI systems are _____

(A) meter, kilogram, second.

(B) meter, kilogram, second, ampere.

(C) meter, kilogram, second, ampere, kelvin, candela, mole.

(D) meter, kilogram, second, ampere, kelvin, candela.

e. Measurement of medium resistance cannot be done by _____

(A) Ammeter-Voltmeter method.

(B) Wheatstone Bridge method.

(C) Substitution method.

(D) Loss of Charge method.

- f. The dual slope integrating DVM technique is excellent in _____
- (A) noise rejection. (B) high voltage measurement.
(C) frequency conversion. (D) low voltage measurement.
- g. The frequency band limit for AF generator are _____
- (A) 15Hz to 100KHz. (B) 30Hz to 300KHz.
(C) 20Hz to 200KHz. (D) 10Hz to 10MHz.
- h. The function of the wave analyzer is _____
- (A) to measure the frequency of the signal.
(B) to measure the phase shift difference.
(C) to measure the harmonic distortion.
(D) to measure the amplitude of each harmonic.
- i. In a Strip Chart Recorder, the data is recorded on _____
- (A) a flat circular chart. (B) a continuous roll of chart paper.
(C) a fixed graph chart paper. (D) none of the above.
- j. Thermistor's resistance at room temperature ranges from _____
- (A) 10Ω to 100Ω . (B) $100\text{ K}\Omega$ to $100\text{ M}\Omega$.
(C) $10\text{ }\Omega$ to $1\text{ M}\Omega$. (D) $100\text{ }\Omega$ to $10\text{ M}\Omega$.

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

- Q.2** a. Explain the following characteristics:
- (i) Accuracy (ii) Precision
(iii) Threshold (iv) Resolution (4×2 = 8)
- b. Three resistors, having resistances of 250Ω , 500Ω and 375Ω are connected in parallel. The 250Ω resistor has a +0.025 fractional error, the 500Ω resistor has a -0.036 fractional error and the 375Ω resistor has a +0.014 fractional error. Determine:
- (i) the total resistance neglecting the errors.
(ii) the total resistance considering the error of each resistor. (8)
- Q.3** a. Draw the circuit of Anderson's Bridge and derive an expression for the unknown inductance. (4+6=10)
- b. Enlist the difficulties in measurement of high resistance. (6)

- Q.4**
- What is a thermocouple? What are its limitations? Name various types of thermocouples. (6)
 - Draw the block diagram of a digital multimeter and explain its operation. (6)
 - Calculate the value of multiplier resistor for a 10V rms range on the voltmeter shown in Fig.1: (4)

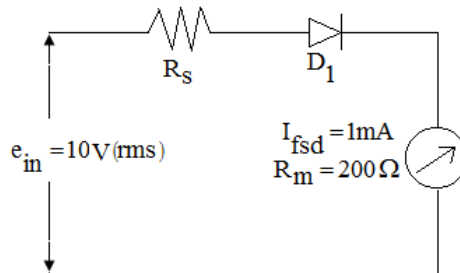


Fig.1

- Q.5**
- With the help of neat block diagram, explain the working of a Dual Slope Digital Voltmeter. (8)
 - Explain the working of Decade Counter with suitable diagram. (8)
- Q.6**
- Draw the basic block diagram of CRO and explain all its elements. What are the advantages of using negative high voltage supply? (12)
 - Enlist the standard specifications of a Signal Generator. (4)
- Q.7**
- Explain how the frequency measurement is done by using the Heterodyne Wave Analyzer with a suitable block diagram. (7)
 - Write the principle of calorimetric method and explain how the power in lossy cable is measured by using thermometer? (9)
- Q.8**
- If the frequency of a signal to be recorded with a Strip Chart Recorder is 20 Hz. What must be the chart speed used to record one complete cycle on 5mm of recording paper? (6)
 - List out the advantages & disadvantages of Direct Recording. (6)
 - Write any four requirements of Data Recording. (4)
- Q.9**
- What is the working principle of an LVDT? Describe its construction with the help of a neat diagram. Also give its limitations. (10)
 - A displacement transducer with a shaft stroke of 3.0 inches is applied to the circuit shown in Fig.2.

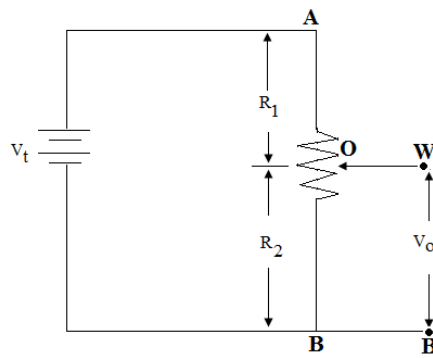


Fig.2

Total resistance of the potentiometer is $5K\Omega$ and the applied voltage V_t is 5V. When the wiper is 0.9 inches from B, what will be the value of the output voltage? (6)