**DECEMBER 2006**

**Code: D-11 Subject: ELECTRONIC INSTRUMENTATION & MEASUREMENTS**
**Time: 3 Hours 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.**
- **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.**

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**Q.1 Choose the correct or best alternative in the following: (2x10)**

a. The smallest increment of the input quantity to which the measuring system responds is called_____.

**(A)** sensitivity **(B)** precision
**(C)** repeatable **(D)** resolution

b. Considering in RTD, if the resistances at temperatures $T_1^\circ$c and $T_0^\circ$c are respectively 136.8 Ω and 120.0 Ω, also the temperature coefficient of resistance is 0.004, then the difference in temperature $\Delta T$ is _____.

**(A)** $35^\circ$ **(B)** $45^\circ$
**(C)** $30^\circ$ **(D)** $42^\circ$

c. The bridge that is useful for measurement of unknown inductance is called ____bridge.

**(A)** Schering **(B)** Maxwell
**(C)** Hay's **(D)** Wien

d. In a CRO the delay line is situated between_____.

**(A)** time base generator and the horizontal amplifier.
**(B)** vertical amplifier and the vertical deflecting plates.
**(C)** trigger circuit and the time base generator.
**(D)** horizontal amplifier and the horizontal deflecting plates.

e. The magnetic flux $\Phi$ is analogous to _____in the electric circuit and is related to the m.m. f. ($\Im$) and the reluctance R as_____.

**(A)** Voltage, $\Im = \frac{\Phi}{R}$

**(B)** Current, $R = \frac{\phi}{\Im}$

**(C)** Current, $\phi = \frac{\Im}{R}$

**(D)** Voltage, $R = \frac{\Im}{\phi}$

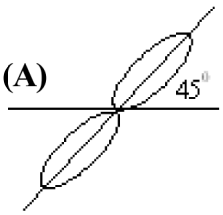
f. Considering a strain gauge, the unit change in length $\left(\frac{\Delta \ell}{\ell}\right)$ is denoted as strain, $\sigma$ and obeys the relation $\sigma$ = _____, where s is the stress in Kg/om$^2$ and E is young's modulus, also in Kg/cm$^2$

**(A)** $\frac{s}{E}$ **(B)** $\frac{1}{Es}$

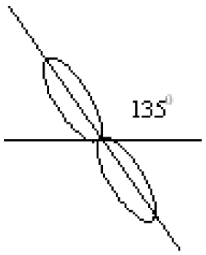
**(C)** $\frac{E}{\sqrt{s}}$ **(D)** $\frac{s}{\sqrt{E}}$

g. When the frequency of a sinusoidal signal applied to the horizontal deflecting plates is twice that of the frequency of a simutar signal applied to the vertical deflecting plates, the Lissajous pattern obtained on the CRT will be_____.

**(A)**




**(B)**




**(C)** **(D)**

h. In respect of receiver measurements, the ability to pick up weak signals is called_____.

**(A)** Noise figure **(B)** selectivity
**(C)** Image response **(D)** sensitivity

i. The A/D converter which resolves a five-digit number in $(2)^5$ comparisons is called a _____A/D converter.

**(A)** Counter type **(B)** successive approximation
**(C)** continuous **(D)** simultaneous

j. The Hall effect transducer is useful for measuring ____in conductors without interruptor of the

circuit.

**(A)** Only D.C. current
**(B)** Only A.C. current
**(C)** Neither DC nor A.C. currents
**(D)** both D.C. and A.C. currents

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

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**Q.2** a. Explain the principle and function of a pressure Inductive transducer, with the help of a schematic diagram. **(6)**

b. Give the circuit-cum-schematic diagram of a simple servo-system and describe its operation. **(10)**

**Q.3** a. Explain the principle of a Digital Frequency meter **(8)**

b. Describe a method for the measurement of flux by means of induced emf. **(8)**

**Q.4** a. Describe the following parts of a CRO (i) Direct probes (1:1) (ii) Passive voltage (High z) Probes (iii) Active probes. **(9)**

b. Give the circuit diagram of a Hay's bridge and describe its uses. Also write its balance equation. **(7)**

**Q.5** a. Distinguish between a sensor and a transducer. Also name three each, of passive and active transducers. **(7)**

b. Give detailed explanation for the terms: (i) Gross errors. (ii) Systematic errors and (iii) Random errors. **(9)**

**Q.6** a. Describe a thermocouple based instrument for measuring temperature. **(8)**

b. A resistance strain gauge with a gauge factor of 2.5 is cemented to a steel member, which is subjected to a strain of $1.6 \times 10^{-6}$. If the original resistance value is 140 Ω, calculate the change in resistance of the gauge. **(8)**

**Q.7** a. Explain the principle and describe the method of F.M. receiver alignment. **(10)**

b. Briefly explain: sensitivity, image rejection and noise figure as applied to radio receivers. **(6)**

**Q.8** Write notes an any **TWO** of the following:-

(I) One type of harmonic distortion analyser based on fundamental suppression.

(II) RF wattmeter based on a toriod core transformer.
(III) Sample-and-hold circuit. **(16)**

**Q.9** a. Describe a counter-type A/D converter with multiplexed input. **(8)**

b. Describe the thermal method for measuring RF power. **(8)**