ROLL NO. _____

Code: AE12 **Subject: INSTRUMENTATION AND MEASUR**

AMIETE – ET (OLD SCHEME)

Time: 3 Hours **JUNE 2012** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

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. Three resistances have the following ratings $R_1 = (150 \pm 5\%)\Omega$, $R_2 = (100 \pm 5\%)\Omega$ and $R_3 = (200 \pm 5\%)\Omega$ when all three are connected in series the percentage error is

(A) $\pm\frac{5}{3}\%$ **(B)** $\pm 5\%$
(C) 15% **(D)** +5%

b. A measure of reproducibility of measurements is known as

(A) Accuracy **(B)** Fidelity
(C) Precision **(D)** Resolution

c. The principle of operation of Q-meter is based on

(A) self inductance **(B)** mutual inductance
(C) series resonance **(D)** parallel resonance

d. The time base signal in a CRO is

(A) Rectangular wave form
(B) High frequency sinuosoidal wave form
(C) Square wave form
(D) High frequency sawtooth wave form

e. Hall effect pick up is used to measure

(A) magnetic flux
(B) current in metals
(C) electron density in semi conductors
(D) all of above

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f. Which of the following is the fastest A/D converter?

(A) Comparator type **(B)** Counter type
(C) Dual slope **(D)** Successive approximation

g. A thermal RF meter reads 84 mW when 15 dB of attenuation is used, the applied power is

(A) 2.7 W **(B)** 3.4 W
(C) 8 W **(D)** 84 mW

h. Error which is not related to frequency counters

(A) Gating error **(B)** Creeping error
(C) Time base error **(D)** Trigger level error

i. Which of the following is not a part of harmonic analyzer?

(A) Mixer **(B)** Oscillator
(C) Active Filter **(D)** D/A converter

j. Tachometer is

(A) Angular velocity transducer **(B)** linear velocity transducer
(C) both **(A)** & **(B)** **(D)** None of the above

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

Q.2 a. Define various static performance characteristics related to measurement system. **(8)**

b. Write the need of calibration and explain process of calibration. **(8)**

Q.3 a. Compare features of digital and analog voltmeters based on advantages and applications. **(8)**

b. Consider the wheatstone bridge as shown in Fig.1. Calculate the deflection of a galvanometer caused by the $5\,\Omega$ unbalanced in arm BC, if galvanometer sensitivity is $10\text{mm}/\mu\text{A}$ and resistance is $100\,\Omega$. **(8)**

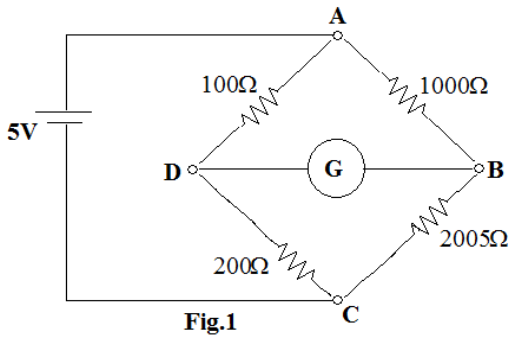

Fig.1

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Q.4 a. Discuss principle of sustained oscillations and draw circuit diagram of sine wave generator. **(8)**

b. Discuss 'gating error' in frequency counter and explain why sometimes it is preferable to measure frequency by period measurement. **(8)**

Q.5 a. Discuss the following:
(i) Deflection sensitivity in CRO.
(ii) Delay line. **(8)**

b. Write applications of the following:
(i) CRO
(ii) Spectrum Analyser. **(8)**

Q.6 a. What is hysteresis loop? How it is obtained by DC and AC methods? **(8)**

b. Discuss working of Thermocouple RF Ammeter, voltmeter method to determine RF power. **(8)**

Q.7 a. Explain the Quieting method to measure sensitivity of communication receivers. **(8)**

b. Discuss the method of measurement of RF power using bolometer. **(8)**

Q.8 a. Explain working principle and write applications of the following:
(i) Strain gauge
(ii) Piezoelectric transducer **(8)**

b. Explain working principle of LVDT. Write its applications. **(8)**

Q.9 a. What is data acquisition system? Compare analog and digital data acquisition system. **(8)**

b. Draw circuit diagram of successive approximation A/D converter and discuss its working. **(8)**