ROLL NO. _____

Code: AE12 Subject: INSTRUMENTATION AND MEASUREMENT

AMIETE – ET (OLD SCHEME)

Time: 3 Hours **OCTOBER 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. A reading is recorded as $23.90^{\circ}C$. The reading has

(A) three significant figures **(B)** five significant figures
(C) four significant figures **(D)** None of the above

b. A 53 Hz reed type frequency meter is polarized with DC. The new range of frequency meter is

(A) 106 Hz **(B)** 26.5 Hz
(C) 53 Hz **(D)** None of the above

c. In a Kelvin's Double Bridge two sets of readings are taken when measuring a low resistance, one with the current in one direction and the other with direction of current reversed. This is done to

(A) bypass the leakage current.
(B) eliminate the effect of resistance of leads.
(C) correct for changes in battery voltage.
(D) eliminate the effect of thermo-electric EMFs.

d. Permanent magnets are tested by

(A) ballistic methods
(B) using an electric circuit having a mutual inductance
(C) potentiometric method
(D) Betteridge apparatus

e. Chopper stabilized AC amplifier may use

(A) an electro mechanical chopper
(B) MOS-FET as choppers
(C) Both **(A)** & **(B)**
(D) None of above

f. An aquadag is used in a CRO to collect

(A) primary electrons **(B)** secondary emission electrons
(C) Both **(A)** & **(B)** **(D)** None of the above

g. A triangular wave is obtained by integrating

(A) a square wave **(B)** square pulse
(C) a sine wave **(D)** all of the above

h. A hall effect transducer can be used for measurement of

(A) power **(B)** current
(C) displacement **(D)** all of the above

i. Absolute Encoders are used for

(A) one revolution **(B)** continuous speed
(C) discreate speeds **(D)** All of the above

j. An 8 bit converter is used for a DC range of 0-10V. The weight of LSB is

(A) 39 mV **(B)** 78 mV
(C) 19.5 mV **(D)** 156 mV

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

Q.2 a. Define the basic static characteristics of instruments. **(8)**

b. Discuss need of calibration and standards. Explain the process of calibration. **(8)**

Q.3 a. Give the classification of transducers. **(6)**

b. Write applications of the following:

(i) Strain gauge (ii) LVDT
(iii) Piezoelectric transducers (iv) Hall effect transducers
(v) Photovoltaic transducers **(10)**

Q.4 a. Explain Bolometer method of power measurement in radio frequency circuits. **(8)**

b. Explain the following:
(i) Receiver parameters
(ii) Dual sweep alignment **(8)**

Q.5 a. Explain working of wave analyzer using block diagram. Write its applications. **(8)**

b. Write applications of the following:

(i) Counter type A to D converter.
(ii) Digital to Analog multiplexing.
(iii) Spatial encoder. **(8)**

Q.6 a. Discuss methods used for extending the frequency range of counters. **(8)**

b. Explain measurement of magnetic flux by induced emf method. Discuss advantage & limitations of this method. **(8)**

Q.7 Explain the function of the following:

(i) Oscilloscope probes.
(ii) Vertical deflection system.
(iii) Time delay circuits.
(iv) Multiple Trace. **(16)**

Q.8 Draw block diagram & explain working of the following:

(i) Digital Voltmeters
(ii) Audio frequency signal generator. **(16)**

Q.9 a. Discuss working of Kelvin double bridge and how it is suitable for measurement of low value resistance. **(8)**

b. Determine value of unknown inductance in terms of bridge parameter for Hay bridge. **(8)**