ROLL NO. _____

Code: AE60 Subject: INSTRUMENTATION AND MEASUREMENTS

AMIETE – ET

Time: 3 Hours **JUNE 2014** **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. X-Y recorders record one quantity:

(A) With respect to another quantity
(B) On X axis with respect to time on Y axis
(C) On Y axis with respect to time on X axis
(D) None of these

b. A quantity whose magnitude has a definite repeating time cycle is called a:

(A) Transient **(B)** Steady state periodic
(C) Steady state unperiodic **(D)** Transient state periodic

c. Frequency can be measured by using

(A) Maxwell's bridge **(B)** Schering bridge
(C) Heaviside Campbell bridge **(D)** Wien's bridge

d. The source of emission of electrons on a CRO is:

(A) PN function diode
(B) barium and strontium oxide coated cathode
(C) Accelerating anodes
(D) post-accelerating anodes

e. In signal generators

(A) Energy is created
(B) Energy is generated
(C) Energy is converted from a simple dc source into ac energy at some specific frequency
(D) All of these

f. Self generating type transducers are:

(A) Active transducer **(B)** Passive transducer
(C) Secondary transducer **(D)** Inverse transducer

g. Which is used in measuring thermal radiations?

(A) CRO **(B)** Recoders
(C) Bolometer **(D)** All of these

h. A load cell is essentially a

(A) Thermocouple
(B) Strain gauge
(C) Thermistor
(D) None of these

i. In CRO the focussing anode is located:

(A) Between pre-accelerating and accelerating anodes
(B) after accelerating anodes
(C) Before pre-accelerating anodes
(D) none of above

j. Dynamic response consists of

(A) Two parts, one steady state and the other transient state response
(B) Only transient state response
(C) Only steady state response
(D) Steady state and transient frequency response

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

Q.2 a. How measurement can be defined and what is its significance? State different methods of measurement. **(8)**

b. Two capacitors 150 ± 2.4μF and 120 ± 1.5μF are connected in parallel. Determine the limiting error of the resultant capacitance in μF and in percentage. **(8)**

Q.3 a. Draw the Maxwell's Bridge, its phasor diagram and derive the equation for determining unknown quantities. **(8)**

b. A dielectric sheet of thickness 1mm is tested at 50Hz between two electrodes of 10 cm diameter. The Schering bridge employed has a standard compressed air capacitor C_3 of 100 pF; a non-inductive resistor R_4 of 350 Ω in parallel with a variable capacitor C_4 and a non-inductive variable resistor R_2. At balance C_4= 0.4μF, R_2 = 250Ω. Calculate the power factor and the permittivity of the sheet. **(8)**

Q.4 a. Describe the construction and working of multi-range ammeter and average responding voltmeter. **(8)**

b. Write short notes on solid state voltmeter. **(8)**

Q.5 a. Draw and explain the circuit of a digital frequency meter. **(8)**

b. Describe with the help of a circuit diagram the working of a universal time counter. **(8)**

Q.6 a. Describe in detail the vertical amplifier and the deflecting system used in a CRO. **(8)**

b. Describe the circuit of a function generator which generates square, triangular and sine wave shapes. **(8)**

Q.7 Explain the following with neat block diagram, any **TWO**: **(8×2)**

(i) Wave analyser
(ii) Harmonic Distortion Analyser
(iii) Bolometer method of power measurement

Q.8 a. Explain the functioning of a basic type of strip chart recorder. Explain the different types of marking mechanisms used in it. **(8)**

b. What is an X-Y recorder? How do you distinguish it from a null type recorder? **(8)**

Q.9 Write technical short notes on **(8×2)**

(i) Data acquisition system
(ii) Digital to Analog converter