ROLL NO. _____

Code: AE60/AE111 Subject: INSTRUMENTATION AND MEASUREMENTS

AMIETE – ET (Current & New Scheme)

Time: 3 Hours **DECEMBER 2018** **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. The part of the response which goes to zero as time becomes large is called
(A) Steady State response **(B)** Static Response
(C) Impulse Response **(D)** Transient Response

b. Time taken by the response of first order system to reach 63.2 % of its final value is called
(A) Settling Time **(B)** Rise Time
(C) Time Constant **(D)** Peak Overshoot

c. The galvanometer has a current sensitivity of 10mm/μA, Current through the galvanometer is 2.77 μA. Calculate the galvanometer deflection.
(A) 27.7 mm **(B)** 2.77 mm
(C) 277 mm **(D)** 0.277 mm

d. Which instrument is used to measure Medium resistance?
(A) Kelvin double bridge **(B)** Wheatstone bridge
(C) Schering bridge **(D)** Anderson bridge

e. Calculate the peak value of 10V rms sine wave
(A) 14.14 V Peak **(B)** 8.99 V Peak
(C) 6.36 V Peak **(D)** 4.5 V Peak

f. The length of the time the trace remains on the screen after the signal has ended is called
(A) Luminance **(B)** Phosphorescence
(C) Persistence **(D)** Fluorescence

g. A short ultra thin wire having positive temperature coefficient of resistance is called
(A) Thermistor **(B)** Baretter
(C) RTD **(D)** Thermocouple

h. In a strip chart recorder period of recorded signal can be calculated as
(A) Time base/Chart Speed **(B)** Chart Speed/ Time base
(C) Cycles/Time **(D)** Cycles x Time

i. The Gauge Factor of the strain gauge is
(A) $(\Delta R/R)/(\Delta L/L)$ **(B)** Stress/Strain
(C) $(\Delta L/L)/(\Delta R/R)$ **(D)** Strain/Stress

j. The type J thermocouple uses the following materials
(A) Copper- Constantan **(B)** Chromel-Alumel
(C) Chromel- Constantan **(D)** Iron –Constantan

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

Q.2	a.	What is hysteresis? Illustrate the hysteresis effect with suitable graphs.	**(8)**
	b.	Explain static error, static correction, dead time and dead zone terms in context of measurements.	**(8)**
Q.3	a.	Derive the expression for the sensitivity of Wheatstone bridge. What is the condition for maximum bridge sensitivity?	**(8)**
	b.	Develop the circuit for the Schering bridge and derive the expression for unknown capacitance and the series resistance representing the loss in the capacitance.	**(8)**
Q.4	a.	Explain the procedure for measurement of very large currents by Thermo couple. Also explain the effect of frequency on calibrations.	**(8)**
	b.	Develop the block diagram of average responding voltmeter and explain the operation.	**(8)**
Q.5	a.	Explain the working of servo balancing potentiometer type DVM	**(8)**
	b.	Explain the function of digital phase meter with neat block diagram.	**(8)**
Q.6	a.	Analyse the working of function generator with necessary block diagram	**(8)**
	b.	Draw the block diagram of Sampling oscilloscope and explain its working.	**(8)**
Q.7	a.	Explain fundamental suppression types in Harmonic distortion analyzer. Also brief basic spectrum analyzer using swept receiver design.	**(8)**

	b.	Describe the procedure for the measurement of power by means of Bolometer Bridge with necessary sketches.	**(8)**
Q.8	a.	Develop the basic circuit for Potentiometric recorder and explain its working.	**(8)**
	b.	Explain Non-Return Zero (NRZ) method of digital recording and discuss the advantages and disadvantages of digital recording.	**(8)**
Q.9	a.	Analyse the characteristics of thermistor with respect to change in temperature versus change in resistance with necessary graph. Describe the measurement range and various configurations. Draw the necessary sketches.	**(8)**
	b.	Draw the block diagram of generalized Data Acquisition System and explain its working	**(8)**