ROLL NO. _____

Code: DE59 Subject: ELECT. INSTRUMENTATION & MEASUREMENT

DipIETE – ET

Time: 3 Hours **DECEMBER 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. The advantages of F.M. magnetic tape recording are

(A) it can record from d.c. to several kHz
(B) it is free from dropout effects
(C) it is independent of amplitude variations and accurately reproduces the waveform of input signal
(D) all of the above

b. In measurement system, which of the following static characteristics are desirable

(A) Accuracy **(B)** Sensitivity
(C) Reproducibility **(D)** All of these

c. Which of the following bridges is preferred for the measurement of inductance having high Q-factor

(A) Maxwell's bridge **(B)** Hay's bridge
(C) Owen bridge **(D** De Sauty bridge

d. X-Y recorders

(A) record one quantity w.r.t. another quantity
(B) record one quantity on X axis w.r.t. time on Y axis
(C) record one quantity on Y axis w.r.t. time on X axis
(D) none of these

e. The guage factor is defined as

(A) $(\delta L/L) / (\delta R/R)$ **(B)** $(\delta R/R) / (\delta L/L)$
(C) $(\delta R/R) / (\delta D/D)$ **(D)** $(\delta R/R) / (\delta A/A)$

f. Frequency can be measured by

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

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

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

h. CRO displays:

(A) AC signals **(B)** DC signals
(C) Both AC and DC signals **(D)** None of these

i. A spectrum analyzer displays

(A) different frequency amplitudes w.r.t. time
(B) peak-peak amplitude of modulating signal
(C) different signal amplitudes w.r.t. frequency
(D) Lissajous figures

j. Thermocouple transducer is used for:

(A) Temperature measurement **(B)** Velocity and vibration measurement
(C) Pressure measurement **(D)** Acceleration measurement

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

Q.2 a. Define the terms:
(i) Accuracy (ii) Precision
(iii) Sensitivity (iv) Resolution
(v) Linearity **(5×2)**

b. A 0-25 A ammeter has a guaranteed accuracy of 1 percent of full scale reading. The current measured by this instrument is 10A. Determine the limiting error in percentage. **(6)**

Q.3 a. List the applications of Wheatstone bridge and explain its limitations? **(8)**

b. Draw the useful modification of Maxwell's inductance capacitance bridge circuit and derive the expression for the unknown element at balance? **(8)**

Q.4 a. Explain the principle of operation of a dc-voltmeter and a multirange voltmeter.**(8)**

b. Explain how the range of a dc-ammeter and a dc voltmeter can be extended? **(8)**

Q.5 a. Explain the working of a dual slope integrating type digital voltmeter with the help of a neat block diagram. **(8)**

b. Explain with the help of diagram working of Digital Capacitance meter. **(8)**

Q.6 a. Describe the working of a standard signal generator. How can a sine wave and a square wave be generated using the signal generator? **(10)**

b. Explain about the storage oscilloscope with the help of a block diagram. **(6)**

Q.7 a. Draw the block schematic of AF wave analyzer. Explain its principle of operation and working. **(8)**

b. Differentiate between a wave analyzer and a harmonic distortion analyzer. **(8)**

Q.8 a. Describe the working of potentiometric type recorder. **(8)**

b. Explain the capacitive transducer arrangement to measure angular velocity. What are its limitations? **(8)**

Q.9 a. Explain the working of a semiconductor strain gauge. What are its specific advantages? **(8)**

b. Explain the general data acquisition system (DAS) with the help of a neat block diagram. **(8)**