ROLL NO. _____

Code: DE59 Subject: ELECT. INSTRUMENTATION & MEASUREMENT

DipIETE – ET

Time: 3 Hours **DECEMBER 2013** **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. Horizontally mounted moving iron instruments use

(A) Eddy current damping **(B)** Electromagnetic damping
(C) Fluid friction damping **(D)** Air friction damping

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

(A) Sensitivity and accuracy
(B) Drift, static error and dead zone
(C) Non linearity
(D) Drift, static error, dead zone and non-linearity

c. The units whose sizes cannot be chosen independently are called.

(A) Derived units **(B)** Fundamental units
(C) Absolute units **(D)** None of these

d. High resistances are provided with a guard terminal. This guard terminal is used to

(A) bypass the leakage current
(B) guard the resistance against stray electrostatic fields
(C) guard the resistance against overloads
(D) none of these

e. Maxwell's inductance-capacitance bridge is used for measurement of inductance of

(A) low Q coils. **(B)** medium Q coils.
(C) high Q coils. **(D)** all of these

f. In electronic ohmmeter, an op-amp is used as a

(A) Summer **(B)** Multiplier
(C) Buffer Amplifier **(D)** Integrator

g. Triangular wave shape is obtained

(A) by integrating the square wave **(B)** by differentiating the square wave
(C) by differentiating a sine wave **(D)** by integrating a cosine wave

h. A strip chart recorder is

(A) An active transducer **(B)** An inverse transducer
(C) An output transducer **(D)** Both **(B)** & **(C)**

i. A resistance potentiometer is a

(A) First order instrument **(B)** Zero order instrument
(C) Second order instrument **(D)** None of these

j. A metal wire bolometer is referred to as

(A) Thermistor **(B)** Barreter
(C) Resistance **(D)** Thermocouples

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

Q.2 a. Discuss Limiting errors and relative limiting errors. **(8)**

b. A voltage has a true value of 1.50V. An analog indicating instrument with a scale range of 2.50V shows a voltage of 1.46 V.

(i) What are the values of absolute error and correction?
(ii) What is the error as a function of the true value and as a % of full scale deflection? **(8)**

Q.3 a. What are the various methods used to measure medium resistance? Explain anyone method in brief. **(8)**

b. Explain working of Anderson's bridge with the help of phasor diagram. Also derive the relation for self inductance of a coil. **(8)**

Q.4 a. What are the general requirements of a shunt? **(4)**

b. A 100 μA meter movement with an internal resistance of 500 Ω is to be used in a 0-100 mA Ammeter. Find the value of the required shunt. **(4)**

c. Explain working of AC voltmeter using rectifiers. **(8)**

Q.5 a. Discuss the working principle and applications of the following: **(12)**
(i) Universal counter
(ii) Voltage to frequency conversion using integrating type DVM.

b. Write the working principle and applications of Q meter. **(4)**

Q.6 Explain the working of the following using block diagram. **(16)**
(i) VHF sampling oscilloscope
(ii) Standard Signal Generator

Q.7 a. Draw the block diagram of Spectrum Analyser and explain its working. **(8)**

b. Explain in brief Self Balancing Bolometer Bridge with the help of a diagram. **(8)**

Q.8 Discuss working principle of the following and write their applications.

(i) Magnetic Recorders **(8)**
(ii) Galvanometer type Recorder **(8)**

Q.9 a. Write applications of the following **(8)**

(i) Differential output transducer
(ii) Capacitive transducer
(iii) Strain Gauges
(iv) Resistive transducers

b. Explain single channel Data Acquisition System (DAS) in brief. **(8)**