ROLL NO. _____

Code: DE59/DE109 Subject: ELECTRONIC INSTRUMENTATION AND MEASURMENT

DipIETE – ET (Current & New Scheme)

Time: 3 Hours **DECEMBER 2015** **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 voltmeter should have

(A) Low internal resistance **(B)** High internal resistance
(C) Electrostatic plates **(D)** A Sensitive amplifier

b. Potentiometer is basically a _____ instrument.
(A) Digital **(B)** Deflecting type
(C) Null type **(D)** Recording

c. Dead zone of an instrument is:
(A) The time required by an instrument to warm up initially
(B) The largest change of input quantity for which there is no output of the instrument
(C) The time required by an instrument to begin to respond to a change in measured
(D) The unmeasured quantity which exceeds the maximum range of the instrument

d. For measuring very high resistance, it use
(A) Megger **(B)** Kelvin Double Bridge
(C) Wheat stone bridge **(D)** None of these

e. One of the following act as an inverse transducer
(A) LVDT **(B)** Capacitive Transducer
(C) Electric resistance potentiometer **(D)** Piezoelectric crystal

f. Load cell can also be used to measure
(A) force **(B)** velocity
(C) specific gravity **(D)** motion

g. Chemical indicator to measure pH are based on

(A) change of colour **(B)** amount of dissolved solid
(C) density of solution **(D)** weight of solution

h. The Potentiometric recorder is a

(A) Galvanometer type **(B)** Selfbalancing
(C) Magnetic **(D)** None of these

i. A linear displacement transducer(digital) normally uses

(A) BCD **(B)** Straight binary code
(C) Hexa decimal code **(D)** Grey code

j. Bolometer used to measure low power is also known as

(A) Thermistor **(B)** Baretter
(C) Calorimeter **(D)** none of these

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

Q.2 a. What are main types of errors in instrumentation system? What are their source, effect and ways to reduce or eliminate these error? Explain in brief. **(8)**

b. What is difference between accuracy and precision? **(4)**

c. A 500 V voltmeter is specified to be accurate within +/-1.5% of full scale. Calculate the limiting error when the instrument's used to measure a 150 V source. **(4)**

Q.3 a. What is Megger? Explain the method for measurement of earth resistors using Megger. **(8)**

b. Explain the working of Kelvin Double Bridge used for the measurement of low resistance. **(8)**

Q.4 a. Explain the operating Principal of Digital PH meter. **(4)**

b. A coil with resistance of 10Ω is connected in the 'direct measurement' mode. Resonance occurs when oscillator frequency is 1.0 MHz and the resonating capacitor is set at 65 pF. Calculate the percentage error introduced in the calculated value of Q by the 0.02Ω insertion resistance. **(4)**

c. With the help of neat diagram, explain the working of Dual Slope Type DVM. **(8)**

Q.5 a. Explain the working of CRO with the help of neat block diagram. **(8)**

b. What are major blocks of diagram of Standard Signal Generator? What does each block do? Explain. **(8)**

Q.6 a. Explain the method of measurement of very large current using thermocouple. List the limitation thermocouple. **(8)**

b. A 150 V voltmeter has an inductance of 0.75 H and a total resistance of 2000ohm. It is calibrated to read correctly on a 50 Hz circuit. What series resistance would be necessary to increase its range to 600V? **(8)**

Q.7 a. What is self balancing? How it is achieved in a bolometer bridge? **(8)**

b. Draw the circuit diagram and explain the working of a heterodyne type wave analyser. **(8)**

Q.8 a. What are the advantages and disadvantages of semiconductor strain gauge? **(4)**

b. The output of an LVDT is connected to a 5V voltmeter through an amplifier with a gain of 250. An output of 2mV appears at the terminals of the LVDT, when the core moves through a distance of 0.5mm. Calculate the sensitivity of of LVDT and also that of whole setup. **(4)**

c. List three types of Temperature transducers and describe the applications of each type of transducer. **(8)**

Q.9 Write short note on the following: **(16)**

(i) XY Recorder
(ii) Potentiometric recorder