ROLL NO. _____

Code: DE59 **Subject: ELECT. INSTRUMENTATION & MEASUREMENT**

DipIETE – ET (Current Scheme)

Time: 3 Hours **JUNE 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. In present day measurement systems _____

(A) direct methods are commonly used
(B) use of direct methods is limited but indirect methods are commonly used
(C) both direct and indirect methods are commonly used
(D) none of these

b. In A.C. circuits, the connection of measuring instruments cause loading errors which may affect _____

(A) only the magnitude of quantity being measured
(B) only the phase of quantity being measured
(C) both the magnitude and phase of the quantity being measured
(D) magnitude, phase and also the waveform of the quantity being measured

c. A Q meter uses the principle of _____

(A) variation of self inductance **(B)** variation of mutual inductance
(C) series resonance **(D)** variation of capacitance

d. The voltage of a circuit is measured by a voltmeter having an input impedance comparable with the output impedance of the circuit thereby causing error in voltage measurement. This error may be called as _____

(A) Gross error
(B) Random error
(C) Error caused by misuse of instrument
(D) Error caused by loading effect

e. The base units in SI system are _____

(A) Metre, Kilogram and Second
(B) Metre, Kilogram, Second and Ampere
(C) Metre, Kilogram, Second, Ampere, Kelvin, Candela and Mole
(D) Metre, Kilogram, Second, Ampere, Kelvin and Candela

f. In a Kelvin's Double Bridge, two sets of readings are taken when measuring a low resistance, one with the current in one direction and the other with direction of current reversed. This is done to _____

(A) eliminate the effect of thermo-electric emfs
(B) eliminate the effect of resistance of leads
(C) correct for changes in battery voltage
(D) eliminate the effect of contact resistance

g. A True RMS Reading Voltmeter uses two thermocouples in order _____

(A) to increase sensitivity
(B) that the second thermocouple cancels out the non-linear effects of the first thermocouple
(C) to prevent drift in the d.c. amplifier
(D) none of these

h. It is required to study transients during switching process. Which of the following CRO should be preferred?

(A) ordinary CRO **(B)** triggered CRO
(C) sampling oscilloscope **(D)** storage oscilloscope

i. Capacitive Transducers are normally used for _____

(A) static measurements
(B) dynamic measurements
(C) both static and dynamic measurements
(D) transient measurements

j. X-Y Recorders record _____

(A) one quantity with respect to another quantity
(B) one quantity on X axis with respect to time on Y axis
(C) one quantity on Y axis with respect to time on X axis
(D) none of these

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

Q.2 a. Explain the following characteristics:
(i) Accuracy
(ii) Precision
(iii) Resolution **(2×3)**

b. Differentiate between the terms "Dead Time and Dead Zone". **(5)**

c. A 0 - 150 V voltmeter has a guaranted accuracy of 1 % of Full Scale Reading. The voltage measured by this instrument is 75 V. Calculate the (i) Relative Error (ii) Limiting Error in percent. **(5)**

Q.3 a. Draw the circuit diagram of a Wheatstone bridge and derive the conditions of balance and bridge sensitivity with equal arms. **(10)**

b. Enlist the difficulties in measurement of high resistance. **(6)**

Q.4 a. What are the various effects of frequency on the calibration of a thermocouple? Explain briefly. **(6)**

b. A basic D'Arsonval movement with a Full Scale Deflection of 50 μA and internal resistance of 500 Ω is used as a voltmeter. Determine the value of the multiplier resistance needed to Measure a voltage range of 0 – 10 V. **(3)**

c. Explain working of Digital pH meter with neat block diagram. **(7)**

Q.5 a. Discuss the working principle and applications of the following:-
(i) Digital Phase Meter
(ii) Voltage to Time Conversion using Dual Slope Integrating Type DVM **(6+6)**

b. Write the working principle and applications of Output Power Meter. **(4)**

Q.6 a. What are the major components of a CRT? Explain the working of Triggered Sweep CRO using block diagram and output waveform. **(8)**

b. Draw the block diagram of a Function Generator and explain the method of producing
(i) Square Waves
(ii) Sine Waves **(8)**

Q.7 a. Draw the block diagram of Hetrodyne Wave Analyser and explain its working. Give its applications. **(8)**

b. What is a Bolometer? Explain the working of Bolometer Mount with the help of a neat diagram. **(8)**

Q.8 a. What is the basic difference between a Strip Chart Recorder and an X-Y Recorder? Explain the working of basic X-Y Recorder with the help of neat diagram. Also give its applications. **(10)**

b. List a minimum of six specifications that should be considered while selecting a recording instrument. **(6)**

Q.9 a. Define electrical transducer. What is the difference between active and passive transducers? **(8)**

b. Explain Multi Channel Data Acquisition System in brief. **(8)**