ROLL NO. _____

Code: DE59 Subject: ELECT. INSTRUMENTATION & MEASUREMENTS

DipIETE – ET

Time: 3 Hours **DECEMBER 2014** **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. Not taking care of zero adjustment of an instrument before measurement can be classified as

(A) systematic error **(B)** gross error
(C) random error **(D)** dynamic error

b. A galvanometer recorder has

(A) very high input impedance **(B)** high input impedance
(C) low input impedance **(D)** very low input impedance

c. A dual beam CRO uses

(A) electronic switch **(B)** two electron guns
(C) one electron gun **(D** two time base generator circuits

d. The sensitivity of a Wheatstone bridge depends upon _____.

(A) galvanometer current sensitivity **(B)** galvanometer resistance
(C) bridge supply voltage **(D)** all of these

e. Analog Spectrum analyzers are also called as _____.

(A) Fourier analyzer **(B)** Digital analyzer
(C) Real time analyzer **(D)** None of these

f. The chart speed of a recording instrument is 30mm/s. One cycle of the signal being recorded extends over 5mm (time base) then the frequency of signal is

(A) 30 cycles / sec **(B)** 6 cycles / sec
(C) 0.3cycles / sec **(D)** 5 cycles / sec

g. A 600V voltmeter is specified to accuracy within ±2% at full scale. The limiting error of the instrument to measure 250V is

(A) 4.8% **(B)** 3.8%
(C) 8.4% **(D)** 8.3%

h. In a Q – meter, the value of shunt resistance connected across the oscillator is typically of the order of

(A) k Ω **(B)** m Ω
(C) Ω **(D)** μΩ

i. Maxwell's bridge is used to measure Q factor in the range of

(A) 1-100 **(B)** 1-10
(C) 1-50 **(D)** 2-200

j. LVDT is

(A) Resistive transducer **(B)** Inductive transducer
(C) Capacitive transducer **(D)** Active transducer

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

Q.2 a. Differentiate between the direct and indirect method of measurement. **(8)**

b. Define limiting errors. A 0-10A ammeter has an accuracy of 1.5% of full scale reading. The current indicated by the ammeter is 2.5 A. Calculate the limiting values of current and percentage limiting error. **(8)**

Q.3 a. A Kelvin's bridge is shown in **Fig.1** below, the ratio of R_a to R_b is 1200 ohms R_1=10 ohms and R_1=0.5R_2. Calculate unknown resistance R_x. **(8)**

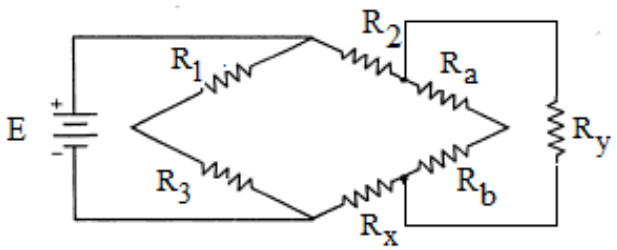
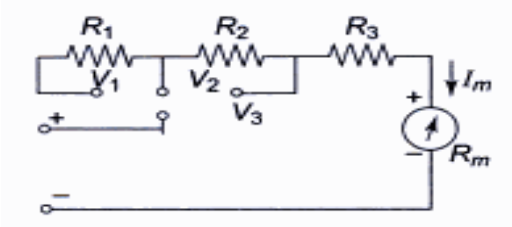


Fig.1

b. Draw circuit and phasor diagram of Schering's bridge and derive the expression for dissipation factor. **(8)**

Q.4 a. Convert a basic D'Arsonval movement, shown in **Fig.2**, with an internal resistance of 100 ohm and full scale deflection of 10mA into a multirange DC voltmeter with ranges from 0-5V,0-50V,0-100V. **(8)**



(8)

Fig.2

b. With a neat block diagram explain the working of True RMS voltmeter. **(8)**

Q.5 a. Explain with the help of a neat diagram the working of a Universal Counter for measurement of frequency and time period. **(8)**

b. Describe the circuit and working of a Q-meter. Write its applications. **(8)**

Q.6 a. Describe with the help of a neat block diagram the operation of an AF Sine and square wave generator. **(8)**

b. What are the advantages of dual trace over dual beam CROs for multiple trace? **(8)**

Q.7 a. What are the applications of wave analyzer? **(8)**

b. What is the dynamic range of a spectrum analyzer with a 30 kHz, 3dB, a noise figure of 15dB and a third order intercept of +25 dBm? **(8)**

Q.8 a. Explain the working of magnetic recorder. Give its applications. **(8)**

b. Discuss in detail the objectives of data recording and selection of recorders for a particular application. **(4+4)**

Q.9 a. Explain the working of LVDT. Where it is used and what are its advantages? **(8)**

b. (i) Calculate the strain in a specimen, if the attached strain gauge has a strain factor of 2, a resistance of 120 Ohms and the change in resistance measured is 0.1 Ohms. **(4)**

(ii) Calculate the gauge factor of a strain gauge made from a material that acts like a perfectly incompressible deforming elastically at strain.(assuming the resistivity doesn't change with strain). **(4)**