Printed Pages : 4

NEE-302

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 121313

Roll No.

B. Tech.

(SEM. III) (ODD SEM.) THEORY EXAMINATION, 2014-15

ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS

Time : 3 Hours] [Total Marks : 100

1 Attempt any FOUR parts : 5x4=20

(a) Describe the Various types of errors in Measurement.

(b) A circuit was tuned for resonance by eight different students, and the values of resonant frequency in kHz were recorded as 532, 548, 543, 535, 546, 531, 543 and 536.

Calculate :

(i) the arithmetic mean

(ii) deviations of mean

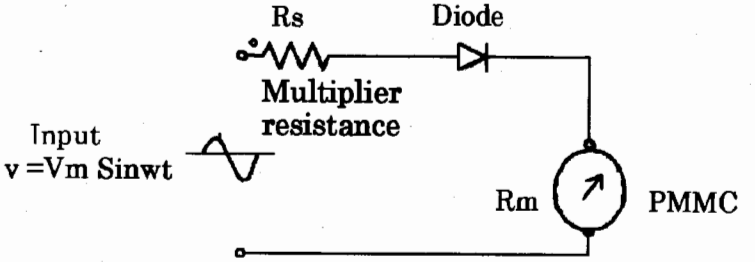
(iii) the average deviation

(iv) Standard deviation

(v) Variance.

(c) The inductance of a 25 A electrodynamic ammeter changes uniformly at the rate of 0.0035 μ H/degree. The spring constant is 10^{-6} N-m/degree. Determine the angular deflection at full scale.

(d) Compute the value of multiplier resistor for a 10 V rms sinusoidal a.c. range of the voltmeter shown in figure. The forward resistance of the diode is zero and the reverse resistance is infinite.



(e) Explain the working principle of thermocouple instruments.

(f) Describe the errors in electrodynamometer type wattmeters.

2 Attempt any TWO parts : **10x2=20**

(a) Describe how high current is measured with the help of instrument transformer. And show the relationships in a current transformer from Equivalent circuit of it.

(b) Explain the applications of potential transformer in the extension of instrument range.

(c) Explain any one type of frequency measuring method with suitable frequency meter.

3 Attempt any TWO parts : **10x2=20**

(a) Describe the substitution method of measurement of medium resistances. List the factors on which the accuracy of the method depends.

(b) A Wheatstone bridge has resistance of P=1000 Ω, Q=100 Ω, R=2,005 Ω and S=200 Ω. The battery has an emf of 5 V and negligible internal resistance. The galvanometer has a current sensitivity of 10 mm/μ A and an internal resistance of 100 Ω. Calculate the deflection of galvanometer and the sensitivity of the bridge in terms of deflection per unit change in resistance.

(c) Derive the equations for balance in the case of Maxwell's inductance capacitance bridge. Draw the phasor diagram for balance conditions.

4 Attempt any TWO parts : **10x2=20**

(a) Calculate the inductance of a coil from the following measurement on an a.c. potentiometer.

(i) Voltage drop across a 0.1 Ω standard resistor connected in series with the coil = 0.613 ∠ 12°6'.

(ii) Voltage across the test coil through a 100/1 volt ratio box = 0.781 ∠ 50°48' V.

(b) A ballistic galvanometer gives a first swing of 60° for a discharge of 1000 μ C. Find the quantity of electricity to produce

(i) a swing of 90° in the instrument

(ii) a spot deflection of 20 mm on a scale 1 m aaway.

(c) Explain in detail about the various methods involved in the measurement of iron loss.

5 Attempt any TWO parts : **10x2=20**

(a) Describe the basic circuit of a spectrum analyser. Explain how the spectra of the following are displayed :

(i) continuous signal

(ii) amplitude modulated signal

(iii) frequency modulated signal

(iv) pulse modulated signal.

(b) Explain, with the help of block diagram, about the various parts of an electronic multimeter.

(c) Describe the following types of oscilloscope in detail :

(i) Dual beam oscilloscope

(ii) Dual trace oscilloscope.