

University Of Technology-Electromechanical Engineering Dept.

Final exam 2013-2014

Class: 2nd

Subject: Electrical Measurements & Devices

Examiner: Dr. Rasha Fahim



Date: / / 2014

Note: Answer five questions

Q1 A) Following readings were obtained in respect of measurement of a current:-

10 A, 11 A, 12 A, 13 A, 14 A. Calculate:-

- a) Arithmetic mean. b) The deviation from the mean. c) Average deviation.
d) Standard deviation e) Probable error. f) Variance.

(12 Marks)

Q2 A) The unknown resistance is determined by Wheatstone bridge and given by the expression $R_x = R_2 R_3 / R_1$ where

$R_1 = 100 \pm 0.4\% \Omega$, $R_2 = 800 \pm 0.7\% \Omega$, and $R_3 = 825 \pm 0.5\% \Omega$. Determine the magnitude of the unknown resistance and the relative limiting error in percent and ohms for the unknown resistance.

(8 marks)

B) Draw and explain the wave analyzer.

(4marks)

Q3 A) The resistance of a moving coil voltmeter is $10K\Omega$ the moving coil has dimensions of $30mm \times 30mm$ and number of turns 100. The flux density in the gap is 0.08 wb/m^2 . Spring control gives a deflection of one degree for a torque of $3 \times 10 \text{ Nm}$. determine the deflection produced by 200V.

(6marks)

B) Define the followings:-

- 1) Resolution. 2) Range or span. 3) Primary transducer. (6marks)

Q4 A) A basic D' Arsonval movement with full scale deflection current of $50\mu A$ internal resistance of 1800Ω is to be used as a multirange voltmeter by using direct method. Calculate the multiplier resistance required to obtain the voltage range of 0-1V, 0-5V, 0-25V, 0-125V.

(6marks)

B) Explain with the help of a schematic diagram the construction of induction wattmeter.

(6marks)

Q5 A) A capacitive comparison bridge is used to measure the capacitive impedance at frequency of 3KHZ. The bridge constants at bridge balance are $R_1 = 1.2K\Omega$, $R_2 = 100K\Omega$, $R_3 = 120 K\Omega$, $C_3 = 10\mu f$. Find the equivalent series circuit of the unknown impedance.

(6marks)

B) Draw and explain the construction of electron gun.

(6marks)

Q6 A) A 230V single phase watt- hour meter has a constant load of 4A passing through it for 6 hours at unity power factor. If the meter disc makes 2208 revolutions during this period what is the meter constant in revolutions/ KWh.

(8marks)

B) Explain the operation of X-Y recorder.

(4marks)

Good luck