



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & computer Control Engineering

Lecturer : Prof. Dr. Medhat El Singaby

Course : Electrical measurement (1)

Course Code : EE 211

Date : 13/1/2015

Marks : 40

Time : 2 hours

Final Exam

Answer the following questions:

Question no.1

A-2

a) the impedance of an R-L circuit operating on ac is given by

$$Z = \sqrt{R^2 + W^2 L^2}$$

the resistance R is known to be 100Ω with uncertainty of 5% ;
 L is known to be $2H$ with uncertainty of 10% ; and W is known exactly
 $2\pi \times 50$, determine the uncertainty in the measurement of Z .

b) the following 10 observations were recorded when measuring a voltage

1	2	3	4	5	6	7	8	9	10
41.7	42	41.8	42	42.1	41.9	42.5	42	41.9	41.8

- Find:
- Mean value
 - Deviations
 - Average deviation
 - Standard deviation
 - Random error

(10 marks)

Question no.2

B-2

- State the main function and construction of a moving iron instrument and show how it could be used for measuring both ac and dc .
- the inductance of a moving iron instrument is given by an expression

$$L = (0.01 + K_1 \Theta)^2 \mu H$$

Where Θ is the angular deflection in radians from zero position. The instrument angular deflections corresponding to currents of 2 and 5 Amperes are 45° and 90° respectively. Find the value of K_1 .

(10 marks)

Members of Course Examination Committee:	Signature:	Date:
Lecturer: <i>Medhat El Singaby</i>	<i>Medhat El Singaby</i>	5/1/2015
Course Coordinator: <i>Ahmed El Shuedy</i>	<i>Ahmed El Shuedy</i>	5/1/2015
Head of Department: <i>Prof. Hanany Ashour</i>	<i>Hanany</i>	5/1/2015

Question no.3

C-1

a) For a dynamometer type instrument ; prove that the torque equation is given by

$$T_d = I_f I_m \frac{dM}{d\theta}$$

b) A 10 Ampere range electro-dynamic ammeter is controlled by a spring having a torsion constant of 1×10^{-7} N.m per degree. The full scale deflection is 110 degrees. Determine the mutual inductance of the instrument when indicating a current of 10A, if the initial inductance is 2 μ H and the change is linear.

(10 marks)

Question no.4

C-3

a) State the main function and theory of operation for a cathode ray tube with electric field deflection.

b) Find the equivalent parallel-resistance and capacitance that causes Wein-bridge, shown in Fig.1, to null with the following component values:
 $R_1 = 3.1 \text{ k}\Omega$; $C_1 = 5.2 \text{ }\mu\text{F}$; $R_2 = 25 \text{ k}\Omega$; $R_4 = 100 \text{ k}\Omega$; $f = 2.5 \text{ KH}$

(10 marks)

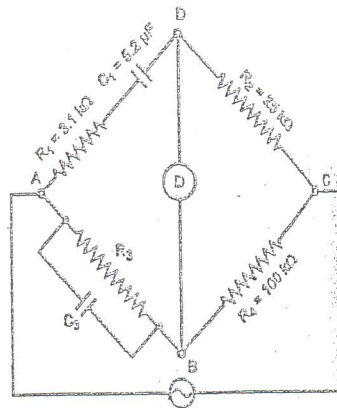


Fig.1

Members of Course Examination Committee:	Signature:	Date:
Lecturer: Medhat El Singaby	M. El Singaby	5/1/2015
Course Coordinator: Ahmed El-Sherk	Ahmed El-Sherk	5/1/2015
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