UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2014/2015

COURSE NAME	:	ELECTRONIC TESTING AND MAINTENANCE
COURSE CODE	:	BWC 31203
PROGRAMME	:	3 BWC
EXAMINATION DATE	:	JUNE 2015 / JULY 2015
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

Q1 (a) Briefly differentiate between the ideal transformer and real transformer.

(4 marks)

(b) What is leakage inductance? Why is measurement of leakage inductance important?

(5 marks)

(c) Draw the schematic diagram of transformer with open circuit secondary terminal, which consist of leakage inductance (LL). How is leakage inductance measured?

(11 marks)

Q2 (a) Describe about the following precision instrument elements for test and measurement.

(i) Impedance
(ii) Phase shift
(iii) Series and parallel equivalencies

(12 marks)

(b) A particular AC series circuit has a resistor of 4 Ω, a reactance across an inductor of 8 Ω and a reactance across a capacitor of 11 Ω. Show the complex impedance of the circuit in RLC graph and express it in both rectangular and polar form.

(4 marks)

(c) Referring to the **Q2(b)**, suppose we have a current of 10 A in the circuit, find the magnitude of the voltage across

(i) the resistor (V_R)
(ii) the inductor (V_L)
(iii) the capacitor (V_C)
(iv) the combination (V_{RLC})

(4 marks)

Q3 (a) Based on **Figure Q3(a)**, is the circuit inductive or capacitive? Determine the current by the complex version of Ohm's Law and also the RMS current.
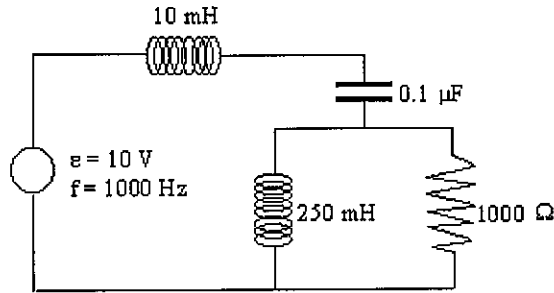

Figure Q3(a)

(10 marks)

(b) Discuss the major sources of measurement errors and ways to minimize errors.

(10 marks)

Q4 (a) Derive the shielding effectiveness (S.E.) below of an infinite sheet of a good conductor using plane wave shielding theory

$$S.E. = 20 \log \frac{\eta_o}{4\eta_s} + 20 \log e^{t/\delta}$$

(14 marks)

(b) A transformer generating primarily a magnetic field is located 10 cm from a shielding structure. The shielding structure is made from a 1 cm thick sheet of copper. Estimate the shielding effectiveness of this structure at 1.5 kHz. (Hint: The wave impedance with the magnetic dipole source at the position of the shield is given by $\eta_o \approx \omega\mu r$). Given $\mu = 4\pi \times 10^{-7} H.m^{-1}$, $\sigma_{copper} = 5.7 \times 10^7 S/m$.

(6 marks)

Q5   (a)   What is an Operational Amplifier (op-amp)?

(2 marks)

(b)   Suggest three test-circuit topologies that commonly used for bench and production testing of DC parameters in op-amp.

(3 marks)

(c)   Suggest five DC test parameters and briefly describe each of them.

(15 marks)

-   **END OF QUESTION -**

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