



UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020**

COURSE NAME : ELECTROMAGNETIC
COMPATIBILITY

COURSE CODE : BEB 41703

PROGRAMME : BEJ

EXAMINATION DATE : DECEMBER 2019 / JANUARY 2020

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL QUESTIONS

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

- Q1**
- (a) Relate the meaning of Electromagnetic Compatibility (EMC) to Electromagnetic Interference (EMI). (3 marks)
 - (b) Calculate the equivalent power in dBm for a sinusoidal signal with an amplitude of 10V peak-to-peak. (3 marks)
 - (c) Identify what is/are the root cause(s) of non-ideal behavior of components. (6 marks)
 - (d) Give **THREE (3)** example of an effect produced by non-ideal behavior of components. (6 marks)
 - (e) **Figure Q1(a)** shows the frequency dependent behaviour of an inductor. Explain the condition mark by the arrow. (7 marks)
- Q2**
- (a) An Open Area Test Site (OATS) and a Semi Anechoic Room (SAR) are normally used for radiated emission testing.
 - (i) Sketch both environments. (6 marks)
 - (ii) Compare the differences between an Open Area Test Site (OATS) and a Semi Anechoic Room (SAR) in terms of construction. (6 marks)
 - (iii) Determine which one is more beneficial and states the reason why. (3 marks)
 - (b) Sketch the construction of a Gigahertz Transverse Electromagnetic (GTEM) cell and name one major benefit it has over the OATS and SAR. (6 marks)
 - (c) The antenna factor is specified in 1/m, and is added to the reading of the spectrum analyser, which is in dBuV. Both units are logarithmic so adding one factor to the other is the same as multiplying them in a linear scale.
 - (i) States the dimension (unit) after adding the antenna factor to the spectrum analyser reading. (2 marks)
 - (ii) Give one example of the calculation in (i). (2 marks)

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- Q3** (a) With an aid of a diagram, state the difference between Common-Mode (CM) and Differential-Mode (DM) currents. (6 marks)
- (b) An EMC engineer is testing an Equipment-Under-Test (EUT) for conducted emission.
- (i) Sketch a diagram on the setup of the conducted emission test. (6 marks)
- (ii) A Line Impedance Stabilisation Network (LISN) is used as part of the conducted emission test setup. Show the role of a LISN. (6 marks)
- (iii) Explain the role of capacitors and inductors inside a power filter that is used to minimize conducted emission. You may want to use schematics to help in the explanation. (7 marks)
- Q4** (a) Electrostatic Discharge (ESD) is the sudden flow of electricity between two electrically charged objects caused by contact, an electrical short, or dielectric breakdown. State **TWO (2)** differences between ESD and lightning phenomena. (5 marks)
- (b) State the interference that is caused by lightning and identify the mitigation techniques to remedy these interferences. (5 marks)
- (c) The Intensive Care Unit (ICU) in hospitals is a form of a faraday cage. Derive a method to test the shielding effectiveness of this room. (10 marks)
- (d) The aperture of the window that is available at a microwave oven enable us to view the heating process inside the oven. Describe how the field inside do not pass through the aperture. (5 marks)

-END OF QUESTIONS -

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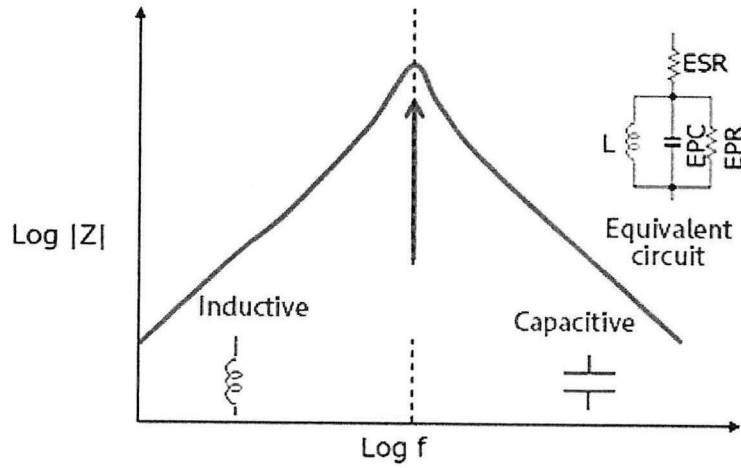


Figure Q1(a): Impedance versus frequency for inductor

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