EASTERN UNIVERSITY, SRI LANKA

FIRST EXAMINATION IN SCIENCE – 2016/2017

SECOND SEMESTER (MARCH/APRIL 2019)

PH 104 AC THEORY

Time: 01 hour

Answer ALL Questions

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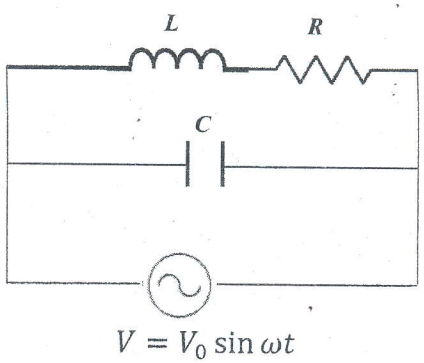
1. Explain the use of complex quantities in the solution of an alternating current problem.

(10 marks)



As shown in the above figure a coil of inductance L and resistance R are connected across the terminals of a capacitor of capacitance C and an alternating voltage $V = V_0 \sin \omega t$ is applied across the same terminals.

(a) Determine the magnitudes and phases of the currents in the circuit and the current drawn from the voltage source.

(30 marks)

(b) Show that the potential difference across the coil will be in phase with the current from the source when

$$\frac{CR^2}{L} + \omega^2 LC = 1$$

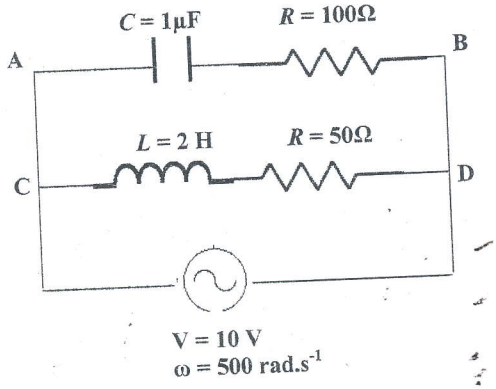
(60 marks)

2. Derive an expression for the complex impedance of the following passiv circuit elements when an alternating voltage of $V = V_0 \sin \omega t$ is applie across the following elements.

(a) resistor, (10 marks)

(b) capacitor, and (10 marks)

(c) inductor. (10 marks)



The values of the passive circuit elements are denoted in the circuit show in the above figure. The amplitude voltage of the source is 10 V, and i angular frequency is 500 rad.s^{-1}. Determine

(a) the complex impedances Z_1 and Z_2 across the branches AB and C respectively (20 Marks

(b) the complex equivalent impedance Z of the circuit (10 Marks

(c) the current I, that passes through the source (20 Marks

(d) the complex currents I_1 and I_2 passing through the branches AB a CD respectively. (20 Marks