SCT 363-2 Electrical systems
3rd year 1st semester
2019

Part B

1. A balanced positive sequence Y connected 60 Hz three-phase source has line to line voltages of $V_{y\,max} = 1000\,V$. This source is connected to balanced Y connected load. Each phase of the load consists of a 0.1 H inductance in series with a 50 Ω resistance.

   a. Draw the diagram for the above circuit. Clearly mention all the voltages and currents.

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(3 marks)

   b. Calculate the V_{rms} value for the source.

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(1 mark)

   c. Find the line currents.

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(3 marks)

8-1

d. Calculate the line to line voltages.

(3 marks

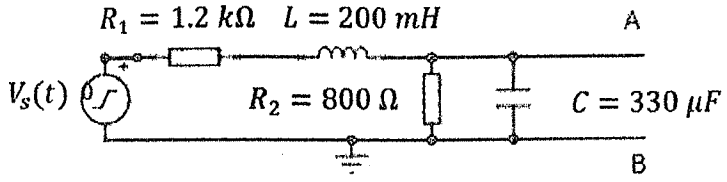
e. Find the active power and reactive power delivered to the load.

(6 mark

f. Draw a phaser diagram showing the line to neutral voltages, the line to line voltag and the line currents. Clearly mark the angles. Assume that the phase angle of V_{an} zero.

(9 mar

2. Consider the following circuit.



a. Find the Thevenin's equivalent of the network for the points A and B at a frequency: $f = 1\ kHz, V_s(t) = 10\cos(\omega t)\ V$

(15 marks)

b. Hence draw the Norton's circuit.

(8 marks)

c. What will be the impedance Z that will dissipate maximum power if it connected through A and B points?

(2 marks)

3. A resistance $100\ \Omega$, an inductance of $125\ mH$ and a capacitance of $20\ \mu F$ are connects in series with a source $100\sin(400t)$.

   a. Draw the circuit diagram and mention all the values.

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(2 marks)

   b. Calculate the magnitude and phase angle of the total impedance.

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(3 marks)

   c. Express the instantaneous current through the circuit as a function of time.

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(3 marks)

d. Calculate the active power, reactive power and apparent power and draw the power triangle for the circuit.

(12 marks)

e. Calculate the power factor of the circuit.

(3 marks)

f. Calculate the value of inductor/capacitor that have to connect in series to the circuit to remove the reactive power component of the circuit.

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(4 marks)

a. What will be the power factor of the circuit after the removal of reactive power component of the circuit as mentioned above. Briefly explain your answer without calculations.

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(3 marks)

[End of Part B]