Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science and Engineering

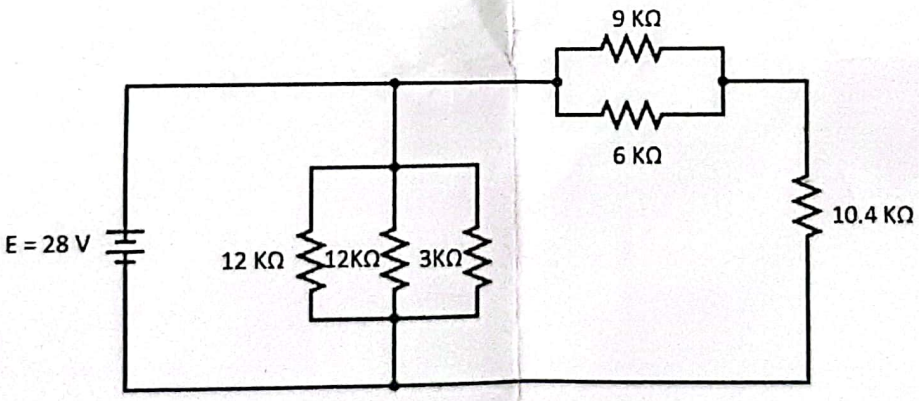
Final Examination, Spring-2024

Course Code: CSE121 Course Title: Electrical Circuits

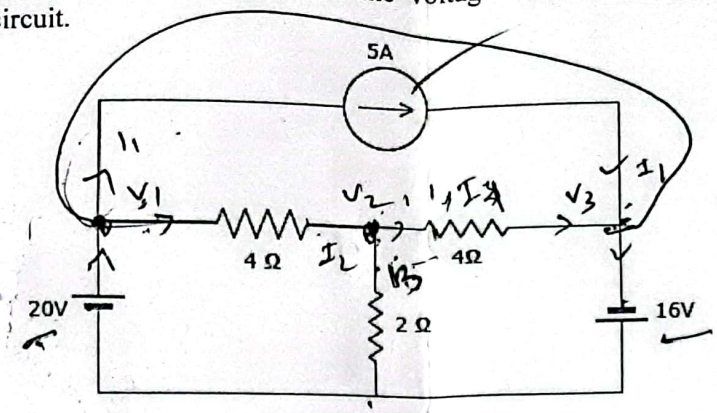
Level: 1 Term: 2 Batch: 65

Time: 2 Hours Full Marks: 40

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

Q1.	**a) Explain** the concept of super node.	5x2=10	CO1
	b) Illustrate the periodic waveform of sinusoidal voltage with peak amplitude and peak-to-peak value.		
	c) Compare the phasor diagram and impedance diagram for the series circuit.		
	d) Interpret the power factor of inductive network.		
	e) Show the complex conjugate of a complex number in rectangular form.		
Q2.	a) **Solve** the equivalent resistance and the value of the current through 10.4 kΩ of the following circuit. 	6x2=12	CO2

b) Apply nodal analysis to determine the voltage across 2Ω resistance in the following circuit.



Q3. **a) Simplify** the following equation to determine the effective values of the waveforms followed by I-V plot and also the average power loss of the circuit whose input current and voltage are as follows: **6x3=18** **CO3**

i. $i = 7sin\,(377t - 70^{\circ})$

ii. $v = 263.9sin\,(377t + 20^{\circ})$

b) The current through a 0.2 H coil is provided.

$$i = 8.5sin\,(377t - 55^{\circ})$$

Now **Simplify** the following equation to find:

i. The sinusoidal expression for the voltage.

ii. Sketch the v and i curves.

iii. Power factor of the v and i and indicate they are leading or lagging.

c) Examine the following R-L circuit to determine the Z_T, I, V_R, V_L, P_T followed by phasor diagram: