## 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
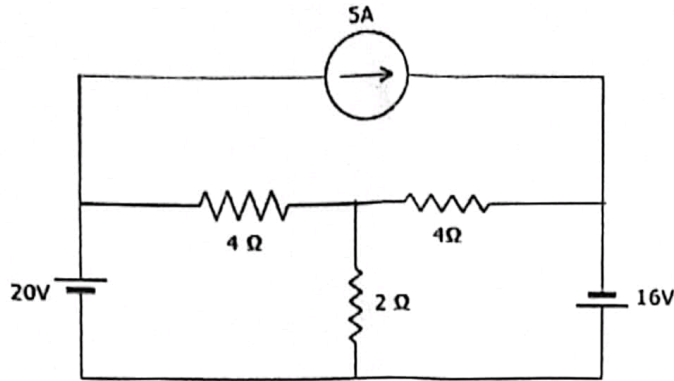Level: 1      Term: 2      Batch: 65

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:

   i.   $i = 7sin\,(377t - 70°)$

   ii.  $v = 263.9sin\,(377t + 20°)$

**6x3=18**  **CO3**

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

$$i = 8.5sin\,(377t - 55°)$$

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: