Daffodil International University
Department of Electrical and Electronic Engineering
Faculty of Engineering
Final Examination, Summer - 2026

Course Code: 0713-111	Course Title: Electrical Circuits I	Teacher's Initial: MRK, KAH
Section: A, B, C, D, E, F	Level-Term: L1-T1	
Full Marks: 40	Exam Date: August 27, 2026	Time: 2 Hours

Answer all questions below. The second right most column indicates the course outcomes (COs) with respective Bloom's level and the right column indicates the allocated marks.

Q1. a) State Superposition theorem. **Obtain** i in the circuit of Fig. 1 using superposition theorem. CO2 C(3) [05]

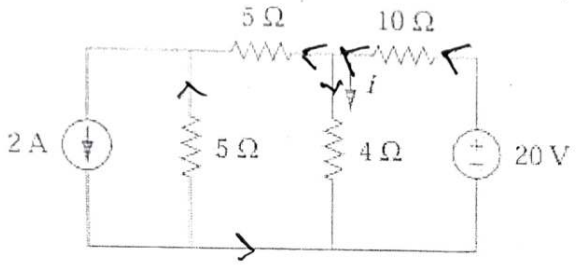


Fig. 1

b) State Thevenin theorem. **Determine** V_0 in the circuit of Fig. 2 applying Thevenin theorem. CO2 C(3) [05]

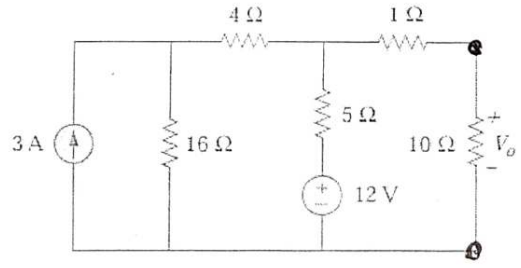


Fig. 2

Q2. a) **State** maximum power transfer theorem. Show that the maximum power transfer takes place when the load resistance equals the Thevenin resistance of the circuit. CO2 C(2) [05]

b) **Determine** the value of R_L that will draw the maximum power from the rest of the circuit shown in Fig. 3. Calculate the maximum power. CO2 C(3) [05]

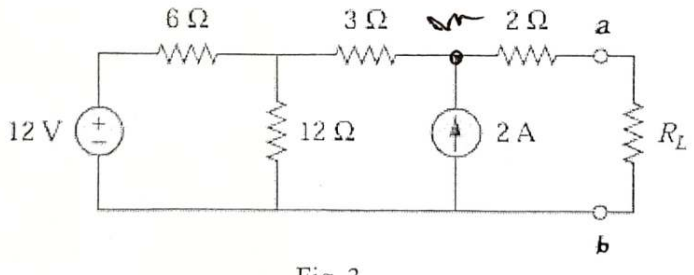


Fig. 3

Q3. a) **Analyze** the transient behavior of a 1st order RC series circuit during charging phase and **sketch** the transient voltage and current up to five-time constants of that network during this phase. CO3 C(4) [04]

b) For the circuit of Fig. 4: CO3 C(4) [06]

i. **Determine** the time constant of the circuit when the switch is thrown into position 1.

ii. **Find** the mathematical expression for the voltage across the capacitor after the switch is thrown into position 1.

iii. **Determine** the mathematical expression for the current following the closing of the switch at position 1.

iv. **Obtain** the voltage v_c and the current i_c if the switch is thrown from position 1 into position 2 at t = 100 ms.

v. **Determine** the mathematical expressions for the volt age v_c and the current i_c if the switch is thrown into position 3 at t = 200 ms.

vi. **Plot** the waveforms of v_c and i_c for a period of time extending from t = 0 to t = 300 ms.

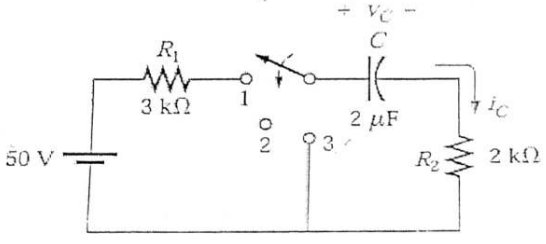
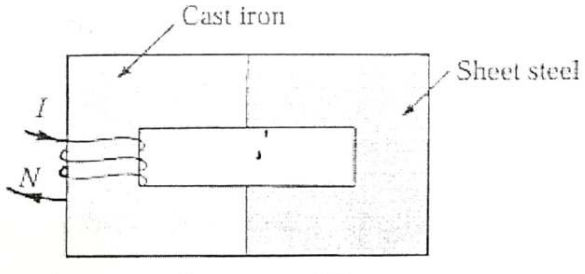


Fig. 4

Q4. a) **Describe** Hysteresis behaviour of the magnetic material with sketching if any. CO1 C(2) [05]

b) **Obtain** the current I required to establish a flux 3 x 10^{-4} Wb in the magnetic circuit of Fig. 5. Also **find** μ and μ_r for Sheet steel and Cast iron both. CO2 C(3) [05]



$l_{\text{iron core}} = l_{\text{steel core}} = 0.3$ m
Area (throughout) = 5×10^{-4} m^2
$N = 100$ turns

Fig. 5

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