



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

Course Code: 0713-121
Section: A, B, C, D, E, F, G
Full Marks: 40

Course Title: Electrical Circuits II
Level-Term: L1-T2
Exam Date: April 25, 2026

Teacher's Initial: MSA, KMT, KNA
Time: 2 Hours

Question no. 1 is COMPULSORY. Answer ANY FOUR from the remaining Questions.

- Q1. The switch in the circuit of Fig. 1 closes at $t = 0$, after being open for a long time. Calculate the transient current $i_3(t)$, if $V_s = 120\sqrt{2} \sin(100\pi t + 30^\circ)$ V. CO-3 8
C(3)

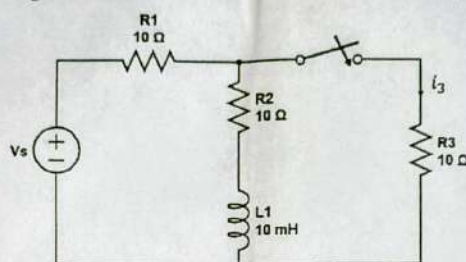


Fig. 1

- Q2. The energy stored in the coupled inductors of the circuit diagram shown in Fig. 2 is given by $\frac{1}{2}L_1 i_1^2 + \frac{1}{2}L_2 i_2^2 - M i_1 i_2$. Derive an expression for the maximum possible value of M from the limiting value of the energy, and define coupling coefficient (k) from your derived expression. What is the range of coupling coefficient? CO-2 8
C(2)

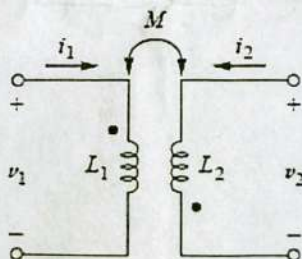


Fig. 2

- Q3. Explain mathematically what type of filter the circuit in Fig. 3 works as. Illustrate the ideal and actual frequency response of the corresponding filter, labeling important point(s). CO-2 8
C(2)

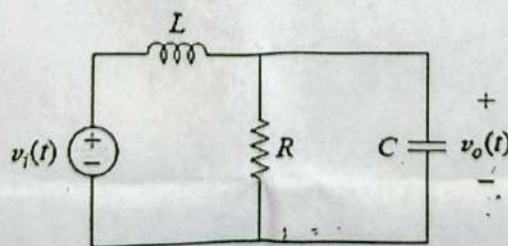


Fig. 3

- Q4. (a) In a parallel RLC resonance circuit, $R = 8 \text{ k}\Omega$, $L = 0.2 \text{ mH}$, $C = 8 \text{ }\mu\text{F}$. Calculate ω_0 , B , Q , ω_1 , and ω_2 . CO-2 4
C(3)

(b) A designer has to design a bandstop filter that will reject a 200 Hz sinusoid while allowing other frequencies to pass. The required bandwidth of the filter is 100 Hz, and the only available resistor has a value of $150\ \Omega$. Draw a suitable circuit that can achieve the required specification using passive components (L and C), and determine the values of all necessary components required for the design.

4

- Q5. (a) For the Δ - Δ circuit in Fig. 5, determine the phase currents, line currents, and total power absorbed by the load.

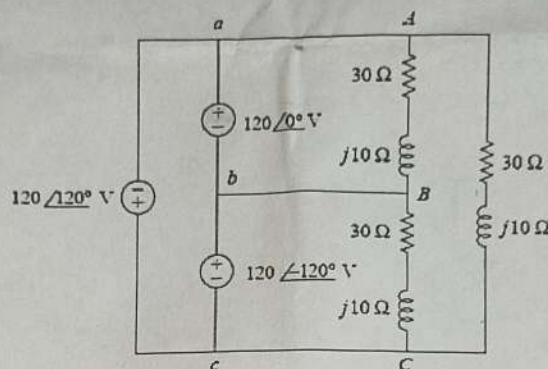
CO-2 4
C(3)


Fig. 5(a)

(b) A three-phase Y-connected motor draws 5.6 kW when the line voltage is 220 V and the line current is 18.2 A. Determine the power factor, reactive power, and complex power absorbed by the motor.

4

- Q6. Determine the currents i_1 and i_2 in the circuit of Fig. 6. Calculate the energy stored in the coupled coils at time $t = 1$ s, if $v_s = 120 \cos 10t$ V.

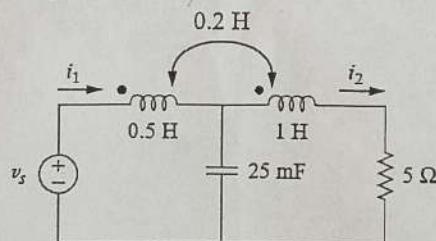
CO-2 8
C(3)


Fig. 6

- Q7. The unbalanced Δ -load of Fig. 7 is supplied by balanced line-to-line voltages of 240 V in the positive sequence.

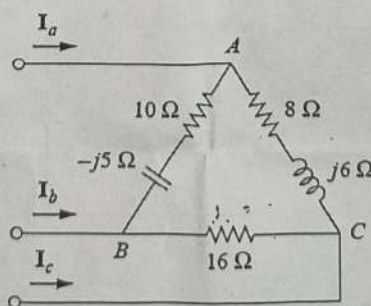
CO-2 8
C(3)


Fig. 7

- (a) Find the line currents I_a , I_b , and I_c .
(b) Compute the total power absorbed by the load.