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Daffodil International University

Department of Electrical and Electronic Engineering
Faculty of Engineering
Final Examination, Fall 2025

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

Course Title: Electrical Circuits II
Level-Term: L1-T2
Exam Date: December 14, 2025

Teacher's Initial: MSA, SZE
Time: 2 Hours

Questions No. 1 and 2 are COMPULSORY. Answer any 3 (THREE) from the rest of the Questions

Q1. (a) **Distinguish** between the frequency response of a BPF and BSF circuit, labeling the graphs properly. **CO-3 C (4)** [04+04 = 08]

(b) **Explain** mathematically what type of filter the circuit in Figure 1(b) works as. **Illustrate** the actual and ideal frequency response of the corresponding filter.

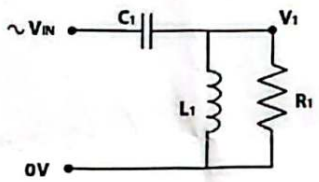

Figure: 1(b)

Q2. (a) **Deduce** the relation of half-power frequencies with circuit elements (R, L, C) of an RLC series resonance circuit. **CO-3 C (4)** [04+04 = 08]

(b) The Quality factor of a band-pass filter circuit is 50. If the resonant frequency of the circuit is 5 krads^{-1}, **calculate** the Bandwidth of the circuit. Also, **illustrate** the circuit with appropriate values of R and C if L = 0.1 H.

Q3. **(a)** **Show** that in a balanced Y-Y circuit, $I_n = 0$. **CO-2 C (3)** [02+02 +04=08]
(b) **Illustrate** the phasor diagram of the Line and Phase voltages of a Y-connected source.
(c) **Calculate** V_x of the circuit in Figure 3(b) using nodal analysis.

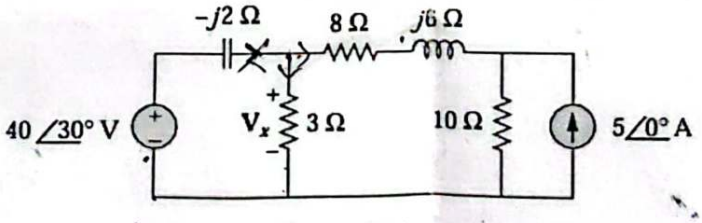

Figure: 3(b)

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Q4. **Calculate** the line currents of the load of the 3-phase unbalanced circuit given in Figure 4. The circuit is operating in abc sequence $V_{an} = 120\angle 45^\circ$ V. **Show** that the total complex power supplied by the source equals the total complex power of the load. **CO-2 C (3)** [05+03 = 08]

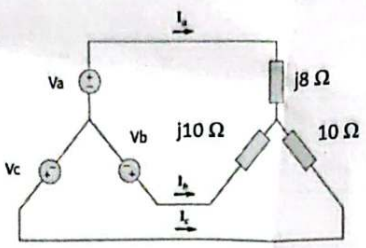
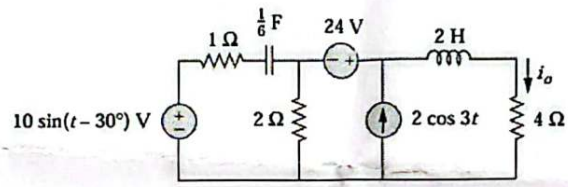


Figure: 4

Q5. (a) **Explain** your understanding of Kirchhoff's Voltage Law (KVL) with a suitable example. **CO-2 C (3)** [02+06 =08]

(b) **Compute** i_o of the circuit in Figure 5(b).



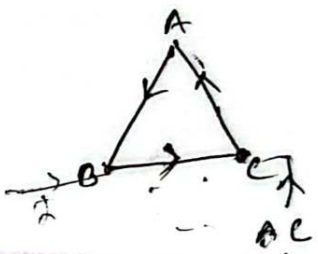


Figure: 5(b)

Q6. (a) In a balanced Δ-Y circuit, $V_{ab} = 110$ V. The per-phase impedance, $Z_Y = (10 + j5)$ Ω. **Compute** the line voltages, line currents, total power, and power factor of the system if the circuit operates in acb sequence. **CO-2 C (3)** [04+04 = 08]

(b) A three-phase wye-connected motor takes 10 kVA at 0.8 power factor lagging from a source of 120V. It is in parallel with a balanced delta load having 12 – j8 Ω impedance per phase. **Calculate** the equivalent impedance per phase, line currents, and power factor of the combination.

Q7. (a) A 5-horsepower, 220V, three-phase motor has an efficiency of 70 percent and operates with a line current of 15 A. **Compute** the power factor at which the motor is operated. **CO-2 C (3)** [02+06 =08]

(b) Use Mesh Analysis to **compute** the current I_o flowing in the circuit in Figure 7.

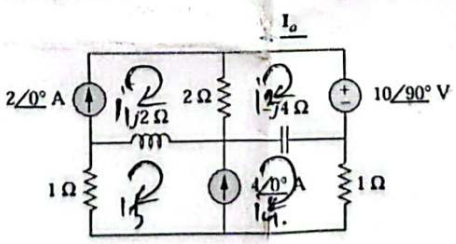


Figure: 7

$Z_Y = \frac{Z_\Delta}{3}$

$I = \frac{V}{R}$. $V = IR$

$\therefore R = \frac{V}{I}$