



Daffodil International University
 Department of Electrical and Electronic Engineering
 Faculty of Engineering
Final Examination, Spring – 2025

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

Course Title: Electrical Circuits II
 Level-Term: L1-T2
 Exam Date: March 21, 2025

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

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

- Q1.** (a) State Thevenin's Theorem. Derive the condition for maximum power transfer in Thevenin's equivalent circuit. CO-2 [04+04]
 C (3) = 08]
- (b) Find Norton's impedance and current of the circuit in Figure 1(b)

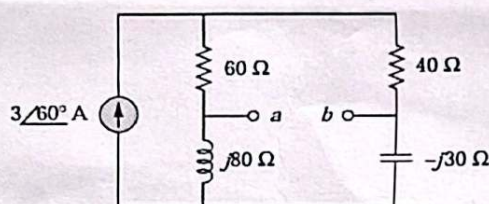


Figure: 1(b)

- Q2.** (a) Identify the type of filter the circuit in Figure 2(a) works as. What will be the corner frequency if $R_1 = 200 \Omega$, $R_2 = 70 \Omega$ and $L = 0.1 \text{ H}$. CO-3 [04+04]
 C (6) = 08]

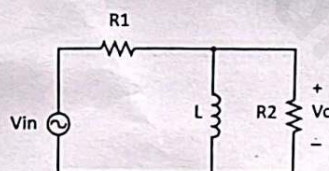


Figure: 2(a)

- (b) The Quality factor of a band-pass filter circuit is 20. If the resonant frequency of the circuit is 3 kHz, then design the circuit with appropriate values of R and C. Note that inductance, $L = 0.1 \text{ H}$
- Q3.** (a) Show that the summation of balanced three-phase voltages is zero. CO-2 [02+06]
 C (3) = 08]
- (b) Calculate v_o of the circuit in Figure 3(b).

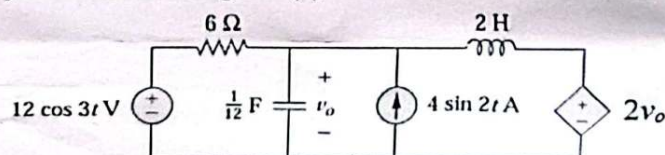


Figure: 3(b)

- Q4. (a) Sketch the ideal and actual frequency response of a band-stop filter circuit with proper labeling. CO-2 [02+06
C (3) = 08]
- (b) Calculate the line currents and total complex power of the load of the 3-phase unbalanced circuit given in Figure 4(b). The circuit is operating in abc sequence $V_{an} = 220\angle 0^\circ$ V.

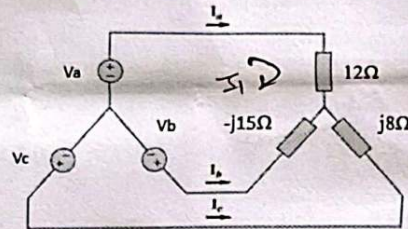


Figure: 4(b)

- Q5. (a) State Kirchhoff's Current Law with an example. CO-2 [02+02
C (3) +04=08]
- (b) Derive the relation between line current and phase current in a delta-connected system.
- (c) Compute V_o of the circuit in Figure 5(c) using Nodal Analysis.

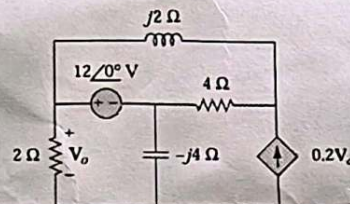


Figure: 5(c)

- Q6. (a) In a balanced Δ -Y circuit, $V_{ab} = 150\angle 30^\circ$ and the per-phase impedance, $Z_Y = (3 - j6)\Omega$. Find the line voltages, line currents, total power, and power factor of the system if the circuit operates in negative sequence. CO-2 [04+04
C (3) = 08]
- (b) A three-phase Δ -connected motor takes 10KVA power with 0.75 power factor (lagging). The motor is connected to a Y load of 10Ω resistance and 18Ω capacitive reactance connected in series in each phase. Calculate the total Volt-Amperes, power factor, and line current of the circuit.

- Q7. (a) Show that in a three-phase system, $Z_\Delta = 3Z_Y$. CO-2 [02+06
C (3) = 08]
- (b) Use Mesh Analysis to find the current I_o flowing in the circuit in Figure 7(b).

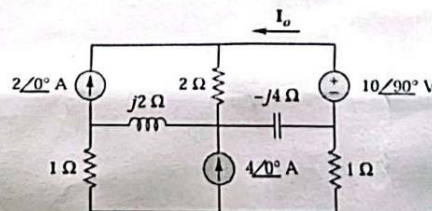


Figure: 7(b)