



**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 CO-2 [04+04  
 Thevenin's equivalent circuit. C (3) = 08]  
 (b) Find Norton's impedance and current of the circuit in Figure 1(b)

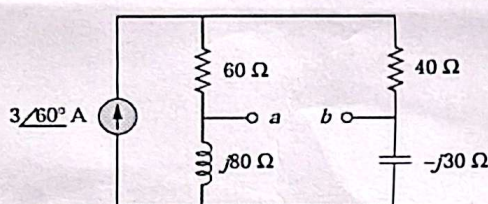


Figure: 1(b)

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

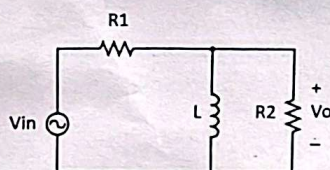


Figure: 2(a)

- (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  
 (b) Calculate  $v_o$  of the circuit in Figure 3(b). C (3) = 08]

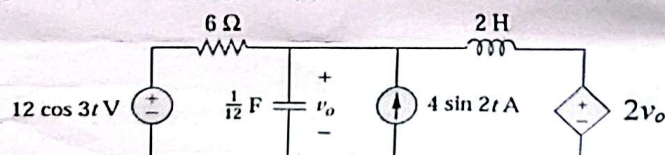


Figure: 3(b)



- 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.

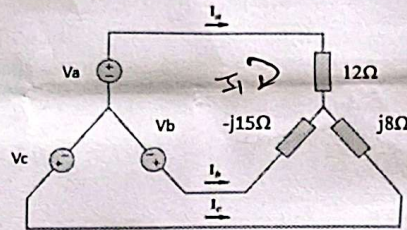


Figure: 4(b)

- 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.

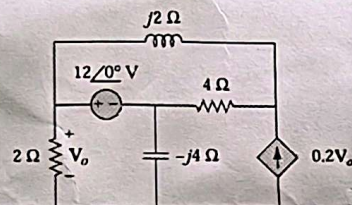


Figure: 5(c)

- Q6. (a) In a balanced  $\Delta$ -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  $\Delta$ -connected motor takes 10KVA power with 0.75 power factor (lagging). The motor is connected to a Y load of  $10\Omega$  resistance and  $18\Omega$  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).

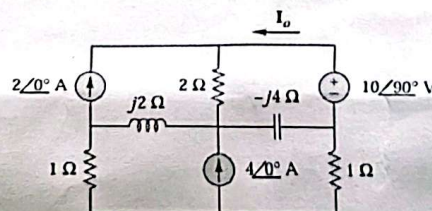


Figure: 7(b)