Network Theory DA-2 solutions

Phone number = $D_1D_2D_3D_4D_5D_6D_7D_8D_9D_{10}$

$D_{avg} = \frac{\Sigma D_n}{10}$, rounded off

If D_{avg} is halfway between two numbers, it is rounded to the nearest even integer.

Question 1

$$Z = \frac{\frac{D_1 - 1j}{D_2} D_3}{D_1 + D_3 - \frac{j}{D_2}}$$

$$i_1 = \frac{D_4}{D_3 + D_8}$$

$$i_2 = \frac{ZD_6}{D_8 + Z + jD_7}$$

$$i_3 = \frac{D_3 D_5}{(D_1 + D_3 - \frac{j}{2D_2})(D_3 + D_8 + j2D_7) - D_3^2}$$

Question 2

$$Z_{Th} = \frac{D_2 D_1 - jD_5}{D_1 + D_2 - jD_5} + \frac{D_4 D_3 + jD_6}{D_4 + D_3 + jD_6}$$

$$V_{Th} = D_{10} \angle \pi \frac{D_1 - jD_5}{D_1 + D_2 - jD_5 - \frac{D_4}{D_3 + D_4 + jD_6}}$$

$$P_{max} = \frac{|V_{Th}|^2}{8(Z.real)}$$

Question 3

$\Delta = D_2D_3D_7 + D_2D_3D_{avg} + D_2D_3D_9 + D_2D_6D_7 + D_2D_6D_{avg} + D_2D_6D_9 + D_2D_7D_9 + D_2D_{avg}D_9 + D_3D_6D_7 + D_3D_6D_{avg} + D_3D_6D_9 + D_3D_7D_{avg} + D_3D_{avg}D_9 + D_6D_7D_{avg} + D_6D_7D_9 + D_7D_{avg}D_9$

$\Delta_1 = D_1D_3D_7 + D_1D_3D_{avg} + D_1D_3D_9 + D_1D_6D_7 + D_1D_6D_{avg} + D_1D_6D_9 + D_1D_7D_9 + D_1D_{avg}D_9 - D_3D_7D_{10} + D_5D_3D_7 - D_3D_8D_{avg} - D_3D_{10}D_9 + D_5D_3D_{avg} + D_5D_3D_9 - D_4D_6D_7 - D_4D_6D_{avg} - D_4D_6D_9 - D_4D_{avg}D_9 + D_6D_7D_8 - D_6D_7D_{10} - D_7D_{10}D_9 + D_5D_7D_9$

$$\Delta_2 = (D_7 + D_{avg} + D_9)(D_3(D_1 - D_4) + (D_2 + D_3 + D_7)(D_4 + D_5 - D_8)) + D_7(D_1D_9 - D_4D_7 - D_4D_9 - D_5D_7 + D_7D_8) - (D_(10) - D_8)(D_2D_9 + D_3D_7 + D_3D_9 + D_7D_9)$$

$$\Delta_3 = -D_1D_3D_7 - D_1D_3D_9 - D_1D_6D_7 - D_1D_7D_9 - D_2D_3D_8 + D_2D_3D_{10} - D_2D_4D_9 - D_2D_5D_9 - D_2D_6D_8 + D_2D_6D_{10} + D_2D_{10}D_9 - D_3D_5D_7 - D_3D_5D_9 - D_3D_6D_8 + D_3D_6D_{10} + D_3D_7D_{10} + D_3D_{10}D_9 + D_4D_6D_7 - D_5D_7D_9 - D_6D_7D_8 + D_6D_7D_{10} + D_7D_{10}D_9$$

$$i_1 = \frac{\Delta_1}{\Delta}, i_2 = \frac{\Delta_2}{\Delta}, i_3 = \frac{\Delta_3}{\Delta}$$