

**SOLUCION EXAMEN DE PROBLEMAS
SEPTIEMBRE DE 2011 (PRIMER CUATRIMESTRE)**

Pregunta 1 : (Solución C)

$$I_R(0^+) = \frac{150}{10} = 15 \text{ A}$$

Pregunta 2 : (Solución D)

$$\bar{Z}_{\text{equivalente}} = 2 \bar{Z}_G = (2 + 1.2 j) \Omega$$

$$\bar{E}_{\text{Thevenin}_{AB}} = \bar{E}_R - \bar{E}_S = 240 \sqrt{3} \left[30^\circ \text{ (con origen en R)} \right. \\ \left. 240 \sqrt{3} = 416 \text{ V} \right]$$

Pregunta 3 : (Solución E)

$$\bar{Z}_{\text{equivalente}} = \bar{Z}_L + \left(\frac{1}{R} + \frac{1}{jX} \right)^{-1} = (1 + j0.5) + \left(\frac{1}{50} + \frac{1}{j50} \right)^{-1} = 36.42 \angle 44.44^\circ \Omega$$

$$\bar{U}_{GN} = \bar{I}_L \bar{Z}_{\text{equivalente}} = 5 \angle 0^\circ 36.42 \angle 44.44^\circ = 182.08 \angle 44.44^\circ \text{ V}$$

Pregunta 4 : (Solución A)

$$I_R = \frac{U_{RN}}{R} = \frac{225}{50} = 4.5 \text{ A}$$

$$I_L = 6 \text{ A}$$

$$I_L^2 = I_R^2 + I_X^2 \rightarrow I_X = \sqrt{6^2 - 4.5^2} = 3.968 \text{ A}$$

Pregunta 5 : (Solución B)

$$S_{\text{total}} = \sqrt{P_{\text{total}}^2 + Q_{\text{total}}^2} = \sqrt{2500^2 + 1250^2} = 2795.08 \text{ VA}$$

$$S_{\text{total}} = \sqrt{3} U_{\text{RS}} I_{\text{R}} = \sqrt{3} U_{\text{RS}} 5$$

de donde igualando $U_{\text{RS}} = 322.75 \text{ V}$

$$U_{\text{G}} - 322.75 = \sqrt{3} (1 \cos(26.56) + 0.5 \sin(26.56)) 5$$

resultando $U_{\text{G}} = 332.42 \text{ V}$

Pregunta 6 : (Solución D)

$$\bar{S}_{\text{G}} = \bar{S}_{\text{Trans+carga1}} + \bar{S}_{\text{Linea}} + \bar{S}_{\text{carga2}} + \bar{S}_{\text{carga3}} \text{ (Teorema de Boucherot)}$$

$$\sqrt{3} 690 \angle 31.78^\circ =$$

$$[(500 + j 300) + (1500 + j 1250)] + 100 + (500 - j 750) + \bar{S}_{\text{carga3}}$$

$$\bar{S}_{\text{carga3}} = 5775.54 \angle 38.63^\circ \text{ VA}$$

Pregunta 7 : (Solución E)

$$P_2 = \sqrt{3} 400 \times 15 \times 0.8 = 8313.84 \text{ W}$$

$$Q_2 = P_2 \tan(\arccos 0.8) = 6235.4 \text{ VAR}$$

$$P_3 = \sqrt{3} 400 \times 10 \times 0.9 = 6235.38 \text{ W}$$

$$Q_3 = P_3 \tan(\arccos 0.9) = 3019.67 \text{ VAR}$$

$$P_{\text{total}} = P_2 + P_3 + P_{\text{condensadores}} = 14549.22 \text{ W}$$

$$Q_{\text{total}} = Q_2 + Q_3 + Q_{\text{condensadores}} = P_{\text{total}} \tan(\arccos(0.9)) = 7045.9 \text{ VAR}$$

$$7045.9 = 6235.4 + 3019.67 + Q_{\text{condensadores}}$$

de donde $Q_{\text{condensadores}} = -2209.16 \text{ VAR}$,

que daremos el resultado en valor absoluto.

Pregunta 8 : (Solución C)

$$\frac{U_1}{2} - 200 = \sqrt{3} \left(\frac{640 \times 10^{-3}}{2^2} 0.8 + \frac{900 \times 10^{-3}}{2^2} 0.6 \right) 13.57$$

dando $U_1 = 412.36 \text{ V}$

$$\text{ya que } r_t = \frac{400}{200} = 2 \text{ y}$$

$$I_2 = \frac{S_2}{\sqrt{3} U_2} = \frac{4700}{\sqrt{3} 200} = 13.57 \text{ A}$$

Pregunta 9 : (Solución B)

$$\bar{I}_0 =$$

$$\bar{U}_1 \left(\frac{1}{R_{fe1}} + \frac{1}{jX_{m1}} \right) = \frac{400}{\sqrt{3}} \left[0^\circ \left(\frac{1}{0.3 \times 10^6} + \frac{1}{j 15 \times 10^3} \right) \right] = 0.0154 \angle -87.137^\circ \text{ A}$$

que corresponde a 15.4 mA

Pregunta 10 : (Solución D)

$$\bar{I}'_2 = \frac{\bar{U}_1}{(R_{C1} + R'_{mec} + jX_{C1})} = \frac{\frac{400}{\sqrt{3}} \angle 0^\circ}{(0.75 + 4.8 + j 1.5)} = 40 \angle -15.12^\circ \text{ A}$$

$$\bar{I}_0 = \bar{U}_1 \left(\frac{1}{R_{fe1}} + \frac{1}{jX_{m1}} \right) = \frac{400}{\sqrt{3}} \left[0^\circ \left(\frac{1}{1000} + \frac{1}{j 1500} \right) \right] =$$

$$\frac{400}{\sqrt{3}} \left[0^\circ \left(\frac{1}{1000} + \frac{1}{j 1500} \right) \right] = 0.28 \angle -33.6^\circ \text{ A}$$

$$\bar{I}_1 = \bar{I}_0 + \bar{I}'_2 = 40.26 \angle -15.24^\circ \text{ A}$$