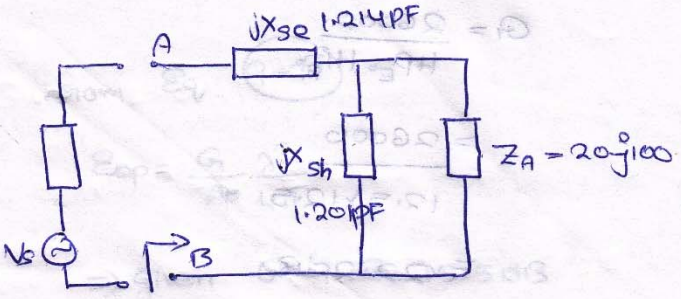
# Antenna Theory and Design

## Homework 12

14)




$$Z_{AB} = Z_S^* = 70 - j20$$

Calculating series reactance

$$Z_{AB} = \frac{jX_{sh}(20 - j100)}{20 + j(X_{sh} - 100)} + jX_{se} = \frac{20X_{sh}^2}{X_{sh}^2 - 200X_{sh} + 10400}$$

$$\Rightarrow \quad \frac{-j100X_{sh}(X_{sh} - 104)}{X_{sh}^2 - 200X_{sh} + 10400} + jX_{se}$$

If the real parts are made equal

$$X_{sh} = 69.09 ; 213.4$$

If Imaginary parts are made equal

$$|X_{sh}| = 69\Omega$$

if $f = 1900MHz$ and $C_{sh} = 1.214pF$

$$|X_{se}| = \frac{1}{\omega C_{se}} \Rightarrow C_{se} = 1.201pF$$

$$Z_{AB} = Z_s^* = 70 - j20\,\Omega$$

$$V_{oc} = \sqrt{8 R_a P_a}$$

$$= \sqrt{8 \times 20 \times 600 \times 10^{-3}}$$

$$= 9.81$$

$$V_{ocrms} = \frac{V_{oc}}{\sqrt{2}}$$

$$= \frac{9.81}{\sqrt{2}}$$

$$= 6.97\ V$$

Power transferred to load $\Rightarrow I_{rms}^2 \, Re|Z_s|$

$$= \frac{6.97}{(40)^2} \times 20$$

$$= 615.2\ mW$$