

Q3 a)

$$15 + j15 = 21.21 \angle 45$$

$$21.21 \angle 45 \times 21.21 \angle 45$$

$$449.86 \angle 90 \quad \text{or} \quad j449.86$$

So

$$\frac{j1349.58}{21.21 \angle 45}$$

or

$$\frac{1349.58 \angle 90}{21.21 \angle 45}$$

$$63.63 \angle 45 = 45 + j45$$

$$\begin{aligned} \text{a)} \quad & \left((45 + j45)(45 + j45) \right) / (90 + j90) \\ & = 22.5 + j22.5 \text{ ohms} \end{aligned}$$

$$\begin{aligned} \text{b)} \quad & \frac{((22.5 + j22.5)(22.5 + j22.5))}{67.5 + j67.5} \end{aligned}$$

$$= \frac{(31.82 \angle 45)(31.82 \angle 45)}{95.46 \angle 45}$$

$$95.46 \angle 45$$

$$\text{So } \frac{1012.51 \angle 90}{95.46 \angle 45}$$

$$= 10.61 \angle 45$$

Q3

b)

$$7.5 + 7.5 \text{ ohms}$$

Q3

c)

$$\frac{40.50 \angle 90}{190.92 \angle 45}$$

$$21.21 \angle 45 = 15 + j15$$

So product over Sum = $7.5 + j7.5$ ohms

d)

$$415 \text{ V} \quad Z = 31.82 \angle 45$$

$$I = \frac{415 \angle 0}{31.82 \angle 45} = 9.221 - j9.221 \text{ amps}$$

Power = VI using complex conjugate of I

So

$$415 (9.221 + j9.221)$$

$$= 3826.715 + j3826.715$$

x 3 for Impedances = $11480.145 + j11480.145$

Real power = 11480.145 watts