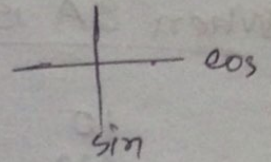


7) a)

$$\begin{aligned} V &= 200 \sin(314t - 30^\circ) \\ &= 200 \cos(314t - 30^\circ - 90^\circ) \\ &= 200 \cos(314t - 120^\circ) \end{aligned}$$



$$\omega = 314 \text{ rad/s}$$

$$\text{Reactance} = \frac{1}{\omega C} = \frac{1}{314 \times 80 \times 10^{-6}} = 39.81 \Omega$$

$$\text{Impedance of } 80 \mu\text{F Capacitor, } Z = \frac{1}{j\omega C}$$

$$\begin{aligned} &= -j39.81 \Omega \\ &= 39.81 \angle -90^\circ \end{aligned}$$

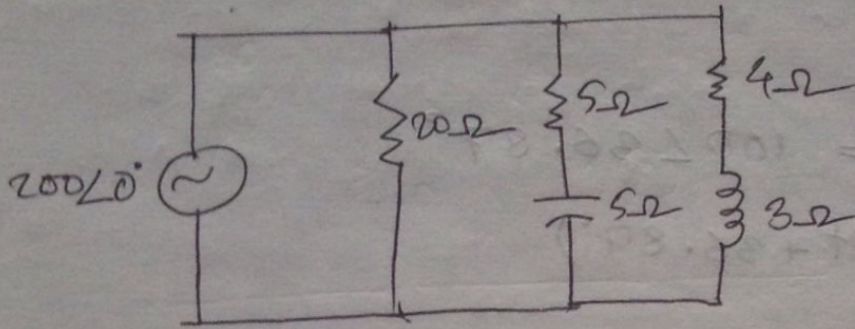
$$\therefore I = \frac{V}{Z} = \frac{200 \angle -120^\circ}{39.81 \angle -90^\circ}$$

$$= 5.02 \angle -30^\circ$$

$$= 5.02 \cos(314t - 30^\circ)$$

(Ans)

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~~Ques 47~~

$$\begin{aligned} \text{Total Impedance, } Z_T &= \{(4+3) \parallel (5+5)\} \parallel 20 \\ &= (7 \parallel 10) \parallel 20 \\ &= \frac{140}{41} \Omega = \frac{140}{41} \angle 0^\circ \end{aligned}$$

$$\text{Total Admittance, } Y = \frac{1}{Z_T} = \frac{41}{140} \text{ S}$$

$$\therefore \text{Total current} = \frac{200\angle 0^\circ}{\frac{140}{41} \angle 0^\circ} = 58.57 \angle 0^\circ$$

Power supplied by source,

$$P = \frac{V^2}{Z_T} = \frac{(200\angle 0^\circ)^2}{\frac{140}{41} \angle 0^\circ} = 11.71 \text{ kW} \quad (\text{Ans})$$

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⑦ ②

$$V = 80 + j60^\circ = 100 \angle 36.87^\circ$$

$$= 100 \cos(\omega t + 36.87^\circ)$$

$$I = -4 + j10^\circ = 2\sqrt{29} \angle 111.80^\circ$$

$$= 2\sqrt{29} \cos(\omega t + 111.80^\circ)$$

$$\text{Impedance, } Z_T = \frac{V}{I} = 9.28 \angle -74.93^\circ$$

$$P = \frac{V^2}{Z_T} = 1077 \angle 148.67^\circ \text{ W}$$