A current flows through a resistance R=10 Ohm what is the expression for instantaneous voltage across the resistance when a) i=5sin314t b) i=10sin(1570-45')

Solution.

$$R = 10\ Ohm;$$

a) $i = 5sin314t;$

b) $i = 10sin(1570 - 45');$

a) $u-?$

b) $u-?$

A general expression for instantaneous current:

$$i = I_{max}sin(\omega t + \varphi_0).$$

A general expression for instantaneous voltage across the resistance:

$$u = U_{max}sin(\omega t + \varphi_0).$$

I_{max} - the peak current;

U_{max} - the peak voltage;

φ_0 – the phase shift.

By Ohm's law:

$$I_{max} = \frac{U_{max}}{R};$$

$$U_{max} = I_{max}R.$$

$$u = I_{max}Rsin(\omega t + \varphi_0).$$

a) $i = 5sin314t;$

$$I_{max} = 5A.$$

The expression for instantaneous voltage across the resistance:

$$u = 5 \cdot 10sin314t = 50sin314t.$$

b) $i = 10sin(1570 - 45');;$

$$I_{max} = 10A.$$

The expression for instantaneous voltage across the resistance:

$$u = 10 \cdot 10sin(1570 - 45') = 100sin(1570 - 45').$$

Answer: a) The expression for instantaneous voltage across the resistance is $u = 50sin314t$.

b) The expression for instantaneous voltage across the resistance is $u = 100sin(1570 - 45')$.