AC Circuit MCQs: 81 to 85

81 The average power loss in 50 µH pure inductance is

(a)50 watt

(b)500 watt

(c)100 watt

(d)Zero

Correct Answer (d): Zero

The power loss in the pure inductor is zero.

82 The charge across capacitor is given by

(a)IV

(b)CV

(c)I^2R

(d)V^2C

Correct Answer (b): CV

The charge across capacitor = $CV = Q / V^2 = Q$)

(As Q = CV or C = Q / V)

83 The vector quantity is represented by

(a)Magnitude

(b)Direction

(c)Either (a) or (b)

(d)Both (a) and (b)

Correct Answer (d): Both (a) and (b)

The vector is represented by both magnitude and direction whereas scaler is represented by magnitude only.

84 The scalar quantity is represented by

(a)Magnitude

(b)Direction

(c)Either (a) or (b)

(d)Both (a) and (b)

Correct Answer (a): Magnitude

The scaler is represented by magnitude only.

85 The symbol j represents anticlockwise rotation of vector quantity through

(a)0^o

(b)45^o

(c)90^o

(d)180^o

Correct Answer (c): 90^o

The vector j is represented by anti-clockwise rotation of vector through 90 degree.

AC Circuit MCQs: 86 to 90

86 The value of operator j is

(a)1

(b)$\sqrt{1}$

(c)$\sqrt{-1}$

(d)$-\sqrt{1}$

Correct Answer (c): $\sqrt{-1}$

87 The operator j^2 is equal to

(a)1

(b)$\sqrt{1}$

(c)-1

(d)$-\sqrt{1}$

Correct Answer (c): – 1

As $j = \sqrt{} - 1$, $j^2 = - 1$

88 The operator j^3 is equal to

(a)1

(b)$\sqrt{}$ 1

(c)– 1

(d)– j

Correct Answer (d): – j

As $j = \sqrt{} - 1$

Now $j^3 = (j^2)(j) = - j$ (because j^2 is equal to – 1)

89 The operator j^4 is equal to

(a)1

(b)$\sqrt{}$ 1

(c)– 1

(d)$\sqrt{}$ – 1

Correct Answer (a): 1

As $j = \sqrt{} - 1$ therefore $j^2 = – 1$

Now $j^4 = j^2 * j^2 = (– 1)(– 1) = 1$

90 The value of the 120^o operator a in the three-phase circuit is

(a)1 + j 0 (1 + $\angle 90^o$)

(b)– 0.5 + j 0.866 (1 + $\angle 120^o$)

(c)– 0.5 – j 0.866 (1 + $\angle$-120^o)

(d)– 1 + j 0 (1 + $\angle 180^o$)

Correct Answer (b): – 0.5 + j 0.866

The value of operator a rotates in the anti-clockwise direction

$a = 1 \angle 120^o = 1 (\text{Cos } 120^o + j \text{ Sin } 120^o) = – 0.5 + j\ 0.866$

More information About Operator j

AC Circuit MCQs: 91 to 95

91 The value of the 120º operator a^2 in the three-phase circuit rotates in the clockwise direction by

(a)120º

(b)240º

(c)– 120º

(d)0º

Correct Answer (a): 120º

The value of operator a rotates in the anti-clockwise direction, a^2 means operated rotates 240 degree in the anticlockwise direction or 120 degree in the clockwise direction.

92 The value of three phase 120º operator a^3 is

(a)0

(b)– 0.5

(c)0.5

(d)1

Correct Answer (d): 1

The operator $a^3 = 1 \angle 360^o = 1 (\text{Cos } 360^o + j \text{ Sin } 360^o) = 1 + j\ 0 = 1$

93 The value of three phase 120º operator a^2 is

(a)– 0.5 + j 0.866

(b) 0.5 + j 0.866

(c)– 0.5 – j 0.866

(d)None of the above

Correct Answer (c): – 0.5 – j 0.866

The operator $a^2 = 1 \angle 240^o = 1 (\text{Cos } 240^o + j \text{ Sin } 240^o) = – 0.5 – j\ 0.866$

94 Which of the following relation is true for the three-phase circuit operator a?

(a) $a^2 + a = – 1$

(b) $a^2 + a = 0$

(c) $a^2 + a = 1$

(d) $a^2 + a = a$

Correct Answer (a): $a^2 + a = – 1$

We have to prove that $a^2 + a = – 1$

Now

$a^2 = 1 \angle 240^o = 1 (\text{Cos } 240^o + j \text{ Sin } 240^o) = – 0.5 – j\ 0.866$ and

$a = 1 \angle 120^o = 1 (\text{Cos } 120^o + j \text{ Sin } 120^o) = – 0.5 + j\ 0.866$

L.H.S. $= a^2 + a = (– 0.5 – j\ 0.866) + (– 0.5 + j\ 0.866) = – 1.0$

95 Which of the following relation is true for the three phase 120º operator?

(a) $a^3 + a^2 + a = 1$

(b) $a^3 + a^2 + a = (– 1)$

(c) $a^3 + a^2 + a = \sqrt{} (– 1)$

(d) $a^3 + a^2 + a = 0$

Correct Answer (d): $a^3 + a^2 + a = 0$

We have to prove that $a^3 + a^2 + a = 0$

Now

$a^3 = 1 \angle 360^o = 1 (\text{Cos } 360^o + j \text{ Sin } 360^o) = 1 + j\ 0 = 1$

$a^2 = 1 \angle 240^o = 1 (\text{Cos } 240^o + j \text{ Sin } 240^o) = – 0.5 – j\ 0.866$ and

$a = 1 \angle 120^o = 1 (\text{Cos } 120^o + j \text{ Sin } 120^o) = – 0.5 + j\ 0.866$

L.H.S $= a^3 + a^2 + a$

$= (1) + (– 0.5 – j\ 0.866) + (– 0.5 + j\ 0.866) = 0$

AC Circuit MCQs: 96 to 100

96 The conjugate of (– x + jy) is

(a)(– x – jy)

(b)(– x + jy)

(c)(x – jy)

(d)(x + jy)

Correct Answer (a): (– x – jy)

The conjugate of (– x + jy) is (– x – jy)

97 The power factor of R - L series circuit is

(a)Unity

(b)Lagging

(c)Leading

(d)Any of the above

Correct Answer (b): Lagging

As the power factor of the inductor is lagging therefore the power factor of the R – L circuit is lagging.

98 The power loss in the R - L series circuit is due to

(a)Inductance

(b)Resistance

(c)Inductive reactance

(d)None of the above

Correct Answer (b): Resistance

There is no power loss in the pure inductive circuit therefore power loss in the RL circuit is only due to resistance of the circuit.

99 Which of the following is true for series RL circuit? V_R = 3V, V_L = 4V, then supply voltage V is

(a)7.0 Volt

(b)1.0 Volt

(c).– 1.0 Volt

(d)5.0 Volt

Correct Answer (d): 5.0 Volt

The voltage vector in the RL Series OR RC Series circuit form Pythagoras therefore

$V = \sqrt{V_R^2 + V_L^2} = \sqrt{(3)^2 + (4)^2} = \sqrt{25} = 5.0$ V

100 The power consumption in the series RL circuit

(a)VI

(b)VI Cos Φ

(c)VI Sin Φ

(d)Zero

Correct Answer (b): VI Cos Φ

The power consumption in the RL or RC or RLC circuit is equal to active power.

P = VI Cos Φ

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