QUIZ – ANSWER KEY

QUIZ NO: 105

TOPIC: ELECTRICAL ENGINEERING

DATE: 02/09/2022

1. A lossless line having 50 ohm characteristic impedance and length wavelength/4 is short circuited at one end connected to an ideal voltage source of 1V at the other end. The current drawn from the voltage sources is ?

   [A] 0

   [B] 0.02

   [C] Infinity

   [D] 50

   Answer: A

   Explanation:-

   For a quarter wave transformer, the input impedance is given by $Z_{in} = Z_0^2/Z_L$. The load impedance will be zero in case of short circuit. Thus the input impedance will be infinite. The current drawn is $I = V/Z_L = 1/\infty = 0$.

2. The capacitance per unit length and the characteristic impedance of a lossless transmission line are C and Z respectively. The velocity of a travelling wave on the transmission line is ?

   [A] ZC

   [B] 1/ZC

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[C] Z/C

[D] C/Z

Answer: B

Explanation:-

The characteristic impedance of the Z = √(L/C) and the velocity of propagation is V = 1/√(LC). Thus we get V = 1/ZC.

3. The minimum distance of the stub from the load side is 5 cm. Calculate the guided wavelength of the transmission line ?

[A] 5 cm

[B] 2.5 cm

[C] 10 cm

[D] 1.25 cm

Answer: C

Explanation:-

The minimum distance of the stub from the load line is given by V_{min} = wavelength/2. On substituting the given value, we get the guided wavelength as 10 cm.

4. One end of a lossless transmission line having the characteristic impedance of 75 ohm and length of 1 cm is short circuited. At 3 GHz, the input impedance at the other end of the transmission line is ?

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[A] 0

[B] Resistive

[C] Inductive

[D] Capacitive

Answer: D

Explanation:-

The input impedance is given by $Z_{IN} = j Z_o \tan 2\pi l/\text{wavelength}$. For short circuited line, $Z_L = 0$. On substituting the given values we get the input impedance as j54.49 ohm.

5. A transmission line is distortionless if ?

[A] RL = 1/GC

[B] RL = GC

[C] LG = RC

[D] RG = LC

Answer: C

Explanation:-

Condition for distortionless line is R/L = G/C. In other words, the rise time constant is equal to the fall time constant. Hence RC = LG.

6. For maximum power transfer, a lossless transmission line 50 ohm is to be matched to a resistive load impedance of 100 ohm. The characteristic impedance of the wavelength/4 transformer is ?

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[A] 70.7

[B] 50

[C] 100

[D] Infinity

Answer: A

Explanation:-

For maximum power transfer, $Z_{in} = Z_0^2/Z_L$. On substituting for the given values, we get the characteristic impedance as 70.7 ohm.

7. In a good conductor the phase relation between the tangential components of electric E and the magnetic field H is as follows ?

[A] E and H are in phase

[B] E and H are out of phase

[C] H leads E by 90

[D] E leads H by 45

Answer: D

Explanation:-

In a conductor, the intrinsic impedance gives the phase relation between E and H. For a conductor, the electric field and magnetic field are in 45 degree phase difference. E and H are 45 leading.

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8. Copper behaves as a ?

[A] Conductor always

[B] Conductor or dielectric depending on the applied electric field strength

[C] Conductor or dielectric depending on the frequency

[D] Conductor or dielectric depending on the electric current density

Answer: A

Explanation:-

- The loss tangent for copper is very large due to its high conductivity. This shows that the copper behaves as a conductor in all conditions.

9. In an impedance Smith chart , a clockwise movement along a constant resistance circle gives rise to ?

[A] Decrease in reactance

[B] Increase in reactance

[C] No change in reactance

[D] No change in impedance

Answer: B

Explanation:-

In clockwise direction, along the constant resistance circle gives rise to an increase in the value of reactance.

10. For an electromagnetic wave incident from one medium to a second medium, total internal reflection takes place when ?

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[A] Angle of incidence is equal to the Brewster angle with E field perpendicular to the plane of incidence

[B] Angle of incidence is equal to the Brewster angle with E field parallel to the plane of incidence

[C] Angle of incidence is equal to the critical angle with the wave moving from the denser to rarer medium

[D] Angle of incidence is equal to the critical angle with the wave moving from the rarer to denser medium

Answer: C

Explanation:-

Total internal reflection takes place when the angle of incidence is greater than the critical angle. Also the wave should move from the denser medium to a rarer medium.