Assignment_0

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2018-08-07, 23:59 IST.

1) For the circuit shown in figure below, find the value of load such that maximum power gets transferred to it. Also find the maximum true power that could be transferred to the load. The circuit is connected to a source 50 \( \angle 0 \) V.

\[ Z_L = -5 + j5 \Omega, \quad Z_L = 5 + j5 \Omega \]

\[ Z_L = -5 + j5 \Omega, \quad P_{max} = 250W \]

\[ Z_L = -5 + j5 \Omega, \quad P_{max} = 200W \]

\[ Z_L = -5 + j5 \Omega, \quad P_{max} = 350W \]

No, the answer is incorrect.

Score: 0

Accepted Answers:

b. \( Z_L = 5 + j5 \Omega, P_{max} = 250W \)

2) Determine the impedance matrix of the circuit shown in figure below

\[ Z_{11} = 4/3, \quad Z_{12} = 2/3, \quad Z_{21} = 1/3, \quad Z_{22} = 2/3 \]

\[ Z_{11} = 5/3, \quad Z_{12} = 2/3, \quad Z_{21} = 2/3, \quad Z_{22} = 5/3 \]

\[ Z_{11} = 5/3, \quad Z_{12} = 1/3, \quad Z_{21} = 1/3, \quad Z_{22} = 2/3 \]
3) Suppose the field vectors in free space are given by
\[ E = 100 \cos \left( \frac{4\pi}{3} \right) \mathbf{a}_x \text{ V/m} \]
\[ H = \frac{100}{200} \cos \left( \frac{4\pi}{3} \right) \mathbf{a}_x \text{ A/m} \]
with \( f = 200 \text{ MHz} \). Determine the direction of power flow and the time-average power crossing the surface area bounded by \( y = 2 \text{ m} \), \( y = 0 \), \( z = 2 \text{ m} \), and \( z = 0 \).

- a. 53 Watts in \(-x\) direction
- b. 13.26 Watts in \(-x\) direction
- c. 13.26 Watts in \(+z\) direction
- d. 53 Watts in \(+z\) direction

No, the answer is incorrect.
Score: 0
Accepted Answers:
- a. 53 Watts in \(-x\) direction

4) A plane wave is travelling in the \(+y\) direction in a lossy medium with constitutive parameters \( \varepsilon_r = 4 \), \( \mu_r = 1 \) and \( \sigma = 0 \). The electric field component of the wave can be written as \( E = 30 \cos \left( 10\pi y + \frac{2\pi}{3} \right) \mathbf{a}_x \text{ V/m} \) at \( y = 0 \). Determine the distance that needs to be traversed by the wave to have a phase shift of \( 90^\circ \).

- a. 10 mm
- b. 2.9 mm
- c. 10 cm
- d. 2.9 cm

No, the answer is incorrect.
Score: 0
Accepted Answers:
- d. 2.9 cm

5) Given that \( H = 0.5e^{-0.1z} \sin(10\pi x - 2z) \mathbf{a}_x \text{ A/m} \). Determine the skin depth.

- (a) 1 m
- (b) 10 m
- (c) 1 cm
- (d) 10 cm

No, the answer is incorrect.
Score: 0
Accepted Answers:
- (b) 10 m

6)
An interface between two media lies in \( yz \) plane at \( x = 0 \), as shown in figure below. Medium 1 has parameters \( \varepsilon_1, j\mu_1 \), and \( \sigma_1 \); and medium 2 has parameters \( \varepsilon_2, j\mu_2 \) and \( \sigma_2 \). If the magnetic flux density vector in region 1 at interface \( (x = 0) \) is given by

\[
\mathbf{B}_1 = \alpha \mathbf{n}_x + \beta \mathbf{n}_y + \delta \mathbf{n}_z \quad \text{Wb/m}^2
\]

determine the magnetic flux density vector \( \mathbf{B}_2 \) at \( x = 0 \). The region conductivities are non-zero but finite.

(a) \( \mathbf{B}_1 = \alpha \mathbf{n}_x + \frac{\beta}{j} \mathbf{n}_y + \frac{\delta}{2\pi} \mathbf{n}_z \)
(b) \( \mathbf{B}_1 = \alpha \mathbf{n}_x + \frac{\beta}{j} \mathbf{n}_y + \frac{\delta}{2\pi} \mathbf{n}_z \)
(c) \( \mathbf{B}_1 = \alpha \mathbf{n}_x + \frac{\beta}{j} \mathbf{n}_y + \frac{\delta}{2\pi} \mathbf{n}_z \)
(d) \( \mathbf{B}_1 = \alpha \mathbf{n}_x + \frac{\beta}{j} \mathbf{n}_y + \frac{\delta}{2\pi} \mathbf{n}_z \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d)

7) Find the Thévenin’s Equivalent of the following circuit. \( (R = 10) \)

(a) \( V_{th} = 1/11 \text{ V}, \ R_{th} = 8/11 \Omega \)
(b) \( V_{th} = 8/11 \text{ V}, \ R_{th} = 1/11 \Omega \)
(c) \( V_{th} = 1/22 \text{ V}, \ R_{th} = 8/22 \Omega \)
(d) \( V_{th} = 2/11 \text{ V}, \ R_{th} = 4/11 \Omega \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a)

8)
The network given in Fig. (a) contains only the resistive elements and reciprocal. By applying the reciprocity theorem, determine the current $I$ through the 1 Ω resistance of Fig. (b).

- a. 2
- b. 3
- c. 5
- d. 4

No, the answer is incorrect.
Score: 0
Accepted Answers:
d. 4