Unit 13 - Week 12

Assignment 12

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

Due on 2020-04-22, 23:59 IST.

For a rectangular PEC cavity of dimensions a and c, the resonant frequencies for the TE modes are given by

$$f_{TE} = \frac{1}{2\pi} \sqrt{\frac{m^2}{a^2} + \frac{n^2}{c^2}}$$

where

- $m = 0, 1, 2, 3, ...$
- $n = 0, 1, 2, 3, ...$
- $a$ and $c$ are not both zero

And resonant frequencies for the TM modes are given by

$$f_{TM} = \frac{1}{2\pi} \sqrt{\frac{m^2}{a^2} + \frac{n^2}{c^2}}$$

where

- $m = 1, 2, 3, ...$
- $n = 1, 2, 3, ...$
- $a$ and $c$ are not both zero

For a rectangular PEC cavity filled with air has dimensions: 10 cm, 10 cm and 30 cm. (Consider all possible configurations of the cavity)

1) What is the lowest resonant frequency for the TE type mode? (Enter the answer in units of GHz. Enter the answer rounded to two decimal places)

No, the answer is incorrect. Score: 0

Assigned Answer: (Type Range) 1.93, 1.93

1.5 points

2) What is the lowest resonant frequency for the TM type mode? (Enter the answer in units of GHz. Enter the answer rounded to two decimal places)

No, the answer is incorrect. Score: 0

Assigned Answer: (Type Range) 1.93, 1.93

1.5 points

Consider the setup shown above. It has an input waveguide in with cross section x = 2 cm and y = 3 cm connected to a rectangular PEC cavity with dimension x = 6 cm, y = 6 cm and z = 6 cm. The output waveguide from the cavity has cross section x = 1 cm and y = 2 cm. Air is filled with air. Ignore reflections between the waveguides and cavity. Assume that the frequencies other than the cavity resonances get linearly attenuated in the cavity. If a source at the input waveguide is swept from 5 GHz to 10 GHz,

3) How many discrete frequencies can be observed at the end of the output waveguide. (Enter the integer value)

No, the answer is incorrect. Score: 0

Assigned Answer: (Type Number) 0

3 points

4) Enter the lowest discrete frequency observed (in units of GHz). (Enter the answer rounded to two decimal places)

No, the answer is incorrect. Score: 0

Assigned Answer: (Type Range) 1.45, 1.55

1 point

5) Enter the highest discrete frequency observed (in units of GHz). (Enter the answer rounded to two decimal places)

No, the answer is incorrect. Score: 0

Assigned Answer: (Type Range) 9.05, 9.5

1 point

6) Consider the demo shown in the lecture video: 'Nuffing of paddles in a microwave oven'

Suppose the distance between ‘antennas’ on the paddled paddle is measured to be 4 cm, estimate the frequency of the source in the microwave oven. (Enter the answer in the units of GHz. Enter the answer rounded to two decimal places)

No, the answer is incorrect. Score: 0

Assigned Answer: (Type Range) 3.73, 3.8

1 point