Unit 12 - Week 11 lectures

Assignment 11

1) A rectangular waveguide with dimensions $a = 2.5$ cm, $b = 1$ cm is to operate below 15.1 GHz. The no. of TE mode that can be possible if the guide is filled with a medium characterized by $\sigma = 0$, $\varepsilon = 4\varepsilon_0$, $\mu_r = 1$?

NOTE: Answer must be in integer form.

Accepted Answers:
(Type: String) 11

2 points

2) In the above question The no of TM modes that can be possible are

NOTE: Answer must be in integer form

Accepted Answers:
(Type: String) 4

1 point

3) A rectangular waveguide has dimension 1.0 cm x 0.5 cm, its cutoff frequency for the dominant mode is

- 5 GHz
- 10 GHz
- 15 GHz
- 20 GHz

Accepted Answers:
15 GHz

1 point

4)
An air-filled rectangular waveguide of dimensions $a = 4$ cm, $b = 2$ cm transports energy in the dominant mode at a rate of 2 mW. If the frequency of operation is 10 GHz, the peak value of the electric field in the waveguide is

- 28.93 V/m
- 37.92 V/m
- 63.77 V/m
- 127.34 V/m

Accepted Answers:
63.77 V/m

5)

An air-filled rectangular waveguide has dimensions $a = 2$ cm and $b = 1$ cm. The range of frequencies over which the guide will operate single mode ($TE_{10}$) is

- $2.5$ GHz $< f < 15$ GHz
- $3.5$ GHz $< f < 12$ GHz
- $3.5$ GHz $< f < 15$ GHz
- $7.5$ GHz $< f < 15$ GHz

Accepted Answers:
$7.5$ GHz $< f < 15$ GHz

6)

An air-filled rectangular waveguide has cross-sectional dimensions $a = 6$ cm and $b = 3$ cm. Given that $E_z = 5 \sin(2\pi x/a) \sin(3\pi y/b) \cos(10^{12} t - \beta z)$ A/m the intrinsic impedance of this mode and the average power flow in the guide are

- $375.1 \Omega$ and $0.84$ W
- $375.1 \Omega$ and $1.58$ W
- $237.1 \Omega$ and $0.85$ W
- None of these

Accepted Answers:
$375.1 \Omega$ and $0.84$ W