NPTEL » Integrated Photonics Devices and Circuits Course outline How does an NPTEL online course work? Week 0 MATLAB Week 1 Week 2 Week 3 Fundamentals of Lightwaves: EM Waves Principle of Optical Waveguiding Fundamentals of Lightwaves: 1 D Optical Waveguide: Ray Optics Model Optical Waveguides: Theory and Design: TIR Based Eigen Mode Solutions for Slab Waveguides Optical Waveguides: Theory and Design: TIR Based Design Solutions for Slab Waveguides Week 3: Lecture notes Quiz: Week 3: Assignment 3 Week 3 Feedback Form: Integrated Photonics Devices and Circuits Week 4 Week 5 Week 6 Week 7

Week 8

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Week 3: Assignment 3

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment.

Due on 2021-08-25, 23:59 IST.

1) For a TE polarized EM wave, at the metallic boundary, the phase and the amplitude of the reflected electric field is same as the incident electric 1 point field.

True False

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

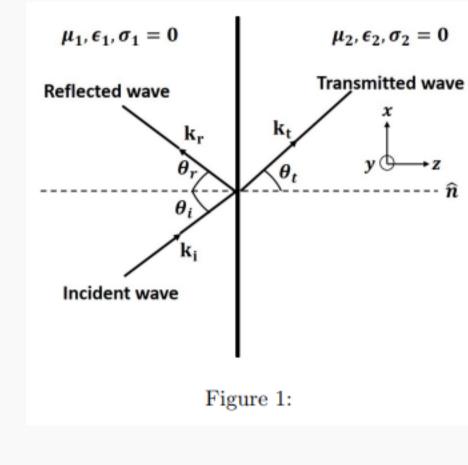
False

2) If a TE polarized EM wave is incident from denser to rarer medium at the critical angle. From the below options, which is/are not correct about 1 point the reflection coefficient Γ and transmission coefficient τ ?

 $\Gamma = 1$ $\tau = 0$ $\tau = 2$ $\tau \neq 0$ $\Gamma = 0$ No, the answer is incorrect. Score: 0 Accepted Answers: $\tau = 0$ $\Gamma = 0$

shown in Fig. 1. Consider $\mu_1=\mu_2=\mu_0$ and $\epsilon_{r1}=2.5,\,\epsilon_{r2}=12$

Common data for questions 3 - 5: Consider an EM plane wave incident from medium 1 to medium 2 as



27.15°

Calculate the minimum angle of incident field for total internal reflection.

1 point

12.02° 2.5° does not exist

No, the answer is incorrect. Score: 0

Accepted Answers: does not exist

If the angle made by the incident wave vector k_i with the interface is 30°, calculate the transmitted angle θ_t

1 point

30° 23.3° 18.8°

13.2°

Score: 0 Accepted Answers: 23.3°

No, the answer is incorrect.

5) For the same incident angle, calculate the reflection coefficient for TE polarization (Γ_{TE}) and TM polarization (Γ_{TM}) -0.6, -0.09

-0.09, -0.6 0.6, 0.09

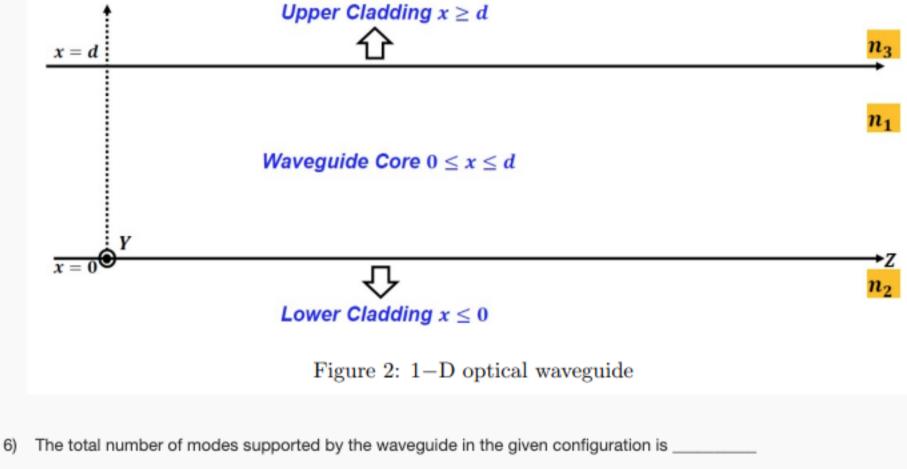
Score: 0

-0.09, 0.6 No, the answer is incorrect.

Accepted Answers: -0.6, -0.09

to graphically solve for the discreet angles of the supported modes and the effective indices at the wavelength $\lambda = 1310$ nm. Consider $n_1 = 3.4778$, $n_2 = n_3 = 1.4657$ and $d = 1 \mu m$.

Common data for questions 6 – 9: For a 1–D optical waveguide shown in Fig. 2, write a MATLAB script



Score: 0 Accepted Answers:

No, the answer is incorrect.

(Type: Numeric) 10

The eigen mode solution of incident angles for TE₀ and TM₁ are _____

80°, does not exist 71°, 79° 68°, 80°

1 point

1 point

80°, 68° No, the answer is incorrect. Score: 0

80°, 68° The effective indices of the TE₂ and TM₅ modes are _____ and _____ , respectively

Accepted Answers:

3.02, 1.69 3.02, not supported

1 point

1 point

not supported, 2.4

3.2, 2.4

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

3.02, not supported

9) For the same core and cladding material and operating wavelength, if the core thickness d is reduced to 500 nm, then the number of modes supported by the waveguide .

increases decreases

_and _____

remains same

No, the answer is incorrect.

Accepted Answers: decreases

 Given a symmetric 1-D waveguide with core index n₁ and upper and lower indices as n₂: If operating wavelength = 1550 nm, thickness of the medium = 1000 nm and $n_1 = 2$, the minimum value of n_2 for the waveguide to support only TE_0 and TM_0 is _

Accepted Answers:

(Type: Range) 1.830,1.850

No, the answer is incorrect.

1 point