Assignment 3

Due on 2020-08-19, 23:59 UTC

1. Which of the following is INCORRECT?
   - The uniform depth of a steady beam increases with wavelength
   - Material changes can alter the guiding fiber.
   - Non of the above
   - The answer is incorrect.
   - The answer is correct.
   - Lower order modes are not confined into the guiding fiber.

2. Consider a dielectric waveguide a planar waveguide with $n_1 = 1.475$, $n_2 = 1.495$ and $2 \mu m$. Out of the waveguides, which waveguide with what mode will be the single mode?
   - None of the above
   - The answer is incorrect.
   - The answer is correct.

3. Out of the following, which may be the possible combination of the two-similar components of electric and magnetic fields for a point T-modes?
   - $E_x, E_y, E_z, H_y, H_z$
   - $E_x, E_y, E_z, H_x, H_z$
   - $E_x, E_y, E_z, H_y, H_x$
   - $E_x, E_y, E_z, H_x, H_y$

4. Determine the angle that the constant plane wave $x = 2 \mu m$ make with the direction of propagation for a planar waveguide with $n_1 = 1.475, d = 2 \mu m, n_2 = 1.495$.
   - 30°
   - 45°
   - 60°
   - 90°

5. Consider a planar waveguide with $n_1 = 1.46, d = 1 \mu m, n_2 = 1.5 \mu m$. The effective index of the 2nd mode is
   - 0
   - 1
   - 2
   - 3

6. Consider a planar waveguide with $n_1 = 1.45, d = 1 \mu m, n_2 = 1.6 \mu m$. Calculate the number of guided s-polarized and a-polarized modes for $n_2 = 2 \mu m$.
   - 1
   - 2
   - 3
   - 4

7. Consider a dielectric waveguide a planar waveguide with $n_1 = 1.475, n_2 = 1.495$ and $d = 2 \mu m$. Calculate the number of guided modes for $n_2 = 2 \mu m$.
   - 1
   - 2
   - 3
   - 4

8. Consider a symmetric waveguide with $n_1 = 1.46, n_2 = 1.5, n_m = 1.5$ and effective indices of separated TIR and TIR modes are 1.775 and 1.785, respectively at $d = 1.6 \mu m$. Calculate the angles that the constant plane waves make with the direction of propagation.
   - 30°, 50°
   - 45°, 70°
   - 60°, 90°
   - 75°, 105°

9. Consider a symmetric waveguide with $n_1 = 1.46, n_2 = 1.5, n_m = 1.5$ and effective indices of separated TIR and TIR modes are 1.775 and 1.785, respectively at $d = 1.6 \mu m$. Calculate the propagation constant of guided mode in the $n_m$ region respectively.
   - 1.25, 1.35
   - 1.30, 1.40
   - 1.35, 1.45
   - 1.40, 1.50