

# Unit 3 - Week 2

## Course outline

How does an NPTEL online course work?

### Week 1

### Week 2

Lec 01-Basic Optics for Optical Sensing-IV

Lec 02-Basic Optics for Optical Sensing-V

Lec 03-Basic Optics for Optical Sensing-VI

Lec 04-Basic Optics for Optical Sensing-VII

Lec 05-Plasmons-I

Quiz : Assignment 2

Solution for Assignment 2

### Week-3

### Week-4

### Download videos

### Weekly Feedback

## Assignment 2

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

**Due on 2020-02-12, 23:59 IST.**

1) If the light ray is passing from air to the medium of refractive index 1.33. What will be the Brewster angle in degree? 1 point

- 50  
 53.06  
 52.08  
 45

No, the answer is incorrect. Score: 0

Accepted Answers: 53.06

2) For the light passing from analyte of refractive index 1.33 to the substrate of refractive index 3.6 what will be the sensitivity of the system using Brewster angle sensing technique. 1 point

- 10 deg/RIU  
 14 deg/RIU  
 15 deg/RIU  
 20 deg/RIU

No, the answer is incorrect. Score: 0

Accepted Answers: 14 deg/RIU

3) For a light wave passing from one medium of refractive index 1.55 to the medium of refractive index 1.33, calculate the critical angle in degree. 1 point

- 53.06  
 59.09  
 52  
 51.03

No, the answer is incorrect. Score: 0

Accepted Answers: 59.09

4) Why the diamond is so shiny with light interaction on it? 1 point

- Due to diffraction of light.  
 Due to scattering of light.  
 Due to total internal reflection of light.  
 Due to polarization of light.

No, the answer is incorrect. Score: 0

Accepted Answers: Due to total internal reflection of light.

5) In a SPR sensor if the light passes from prism to analyte as sensing medium, what will be the sensitivity of the sensor if the refractive index of the prism is 1.515 and the refractive index of the analyte is 1.33. 1 point

- 68.97 deg/RIU  
 70.97 deg/RIU  
 78.97 deg/RIU  
 80.93 deg/RIU

No, the answer is incorrect. Score: 0

Accepted Answers: 78.97 deg/RIU

6) If the light is passing from analyte of refractive index  $n_a$  to the substrate of refractive index  $n_s$ . What will be the sensitivity of the system using Brewster angle sensing technique. 1 point

- $\frac{n_s}{n_s + n_a}$   
  $\frac{n_s^2}{n_s^2 + n_a^2}$   
  $\frac{n_s^2}{n_s + n_a}$   
  $\frac{n_s}{n_s^2 + n_a^2}$

No, the answer is incorrect. Score: 0

Accepted Answers:  $\frac{n_s}{n_s^2 + n_a^2}$

7) For the given evanescent wave equation, define the direction of propagation of this wave. 1 point

$$E = E_0 e^{i\left(\omega t - \left(\pm i k_2 \sqrt{\sin^2 \theta_2 - 1}\right) x - k_2 \sin \theta_2 z\right)}$$

- Z direction  
 X direction  
 30 degree from X axis  
 60 degree from Z axis

No, the answer is incorrect. Score: 0

Accepted Answers: Z direction

8) For the given evanescent wave equation, define the decay 1 point

$$E = E_0 e^{i\left(\omega t - \left(\pm k_2 \sqrt{\cos^2 \theta_2}\right) y - k_2 \sin \theta_2 x\right)}$$

direction of evanescent wave amplitude.

- X direction  
 Y direction  
 Perpendicular to XY plane.  
 Direction can not be predicted.

No, the answer is incorrect. Score: 0

Accepted Answers: Y direction

9) The Penetration depth of an evanescent wave is defined by \_\_\_\_\_. 1 point

- $\frac{\lambda}{2\pi\sqrt{n_1^2 \sin^2 \theta_1 - n_2^2}}$   
  $\frac{2\lambda}{2\pi\sqrt{n_1^2 \sin^2 \theta_1 - n_2^2}}$   
  $\frac{\lambda}{\sqrt{n_1^2 \sin^2 \theta_1 - n_2^2}}$   
  $\frac{1}{\sqrt{n_1^2 \sin^2 \theta_1 - n_2^2}}$

No, the answer is incorrect. Score: 0

Accepted Answers:  $\frac{\lambda}{2\pi\sqrt{n_1^2 \sin^2 \theta_1 - n_2^2}}$

10) Penetration depth of evanescent wave is directly proportional to which quantity. 1 point

- Wavelength  
 Refractive index of first medium  
 Refractive index of second medium  
 Angle of incidence at the interface

No, the answer is incorrect. Score: 0

Accepted Answers: Wavelength