

Unit 13 - Week 11

Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

● Lecture 49 : Photo elastic Property of Materials

● Lecture 50 : Photo elastic Property of Materials (Contd.)

● Lecture 51 : Photo elastic Property of Materials (Contd.)

● Lecture 52 : Faraday Effect

○ Lecture 53 : Faraday Effect (Contd.)

● Lecture 54 : Electron Diffraction

○ Lecture 55 : Electron Diffraction (Contd.)

○ Quiz : Assignment 11

○ Week 11 Feedback Form

Week 12

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Assignment Detailed Solution

Text Transcripts

Live Interactive Session

Assignment 11

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

Due on 2020-04-15, 23:59 IST.

1) The birefringence induced by mechanical stress applied to normally isotropic substances such as plastic or glass is the basis for the method of stress analysis called 1 point

- (a) Photo elasticity
- (b) Photoelectric effect
- (c) Photovoltaic effect
- (d) Photometry

- (a)
 (b)
 (c)
 (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a)

2) The index of refraction (for sodium light $\lambda = 5893 \text{ \AA}$) of the E-ray and O-ray for calcite ($\mu_e = 1.486$; $\mu_o = 1.658$) and quartz ($\mu_e = 1.553$; $\mu_o = 1.544$). If the quarter-wave plate made from both the crystal individually then find out the relation of their plate thickness. 1 point

- (a) Quarter-wave plate made from calcite to be thicker than one made from quartz
- (b) Quarter-wave plate made from quartz to be thicker than one made from calcite
- (c) Both will be same thickness
- (d) Quarter-wave plate thickness independent

- (a)
 (b)
 (c)
 (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(b)

3) Plane polarized light is incident on a piece of quartz cut with faces parallel to the optic axis. Find the least thickness of the quartz crystal for which the ordinary and extra-ordinary rays combine to form plane polarized light. Given that ($\mu_o = 1.5442$; $\mu_e = 1.5533$) and $\lambda = 5 \times 10^{-5} \text{ cm}$. 1 point

- (a) $1.24 \times 10^{-5} \text{ cm}$
- (b) $3.74 \times 10^{-4} \text{ cm}$
- (c) $2.74 \times 10^{-3} \text{ cm}$
- (d) $5.12 \times 10^{-2} \text{ cm}$

- (a)
 (b)
 (c)
 (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(c)

4) Calculate the thickness of calcite plate which would convert a plane polarized light, incident at an angle of 45° with its optic axis, into circularly polarized light. Given that ($\mu_o = 1.65836$; $\mu_e = 1.48641$) and $\lambda = 5893 \text{ \AA}$. 1 point

- (a) $8.56 \times 10^{-5} \text{ cm}$
- (b) $6.46 \times 10^{-4} \text{ cm}$
- (c) $4.31 \times 10^{-3} \text{ cm}$
- (d) $2.12 \times 10^{-2} \text{ cm}$

- (a)
 (b)
 (c)
 (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a)

5) Quartz has a refractive index for the ordinary ray $\mu_o = 1.544$ and for the extra-ordinary ray $\mu_e = 1.553$ when measured with sodium light $\lambda = 5893 \text{ \AA}$. What thickness of quartz crystal should be placed between a crossed polarizer and analyzer will produce annulment of light. Quartz cut with faces parallel to the optic axis. 1 point

- (a) $2.32 \times 10^{-5} \text{ cm}$
- (b) $3.76 \times 10^{-4} \text{ cm}$
- (c) $6.54 \times 10^{-3} \text{ cm}$
- (d) $4.54 \times 10^{-2} \text{ cm}$

- (a)
 (b)
 (c)
 (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(c)

6) The linearly polarized light, superposition of a right circularly polarized light (RCP) and a left circularly polarized light (LCP), is propagating through a dielectric medium having length $l = 0.05 \text{ m}$. If a static magnetic field $H = 4 \times 10^6 \text{ A/m}$ is applied along the direction of propagation of the light, then find out the angle θ by which the plane of polarization will be rotate. The verdet constant of the dielectric material is $V = 5 \times 10^{-6} \text{ radians/ampere}$. 1 point

- (a) $(27.12)^\circ$
- (b) $(35.37)^\circ$
- (c) $(57.32)^\circ$
- (d) $(73.12)^\circ$

- (a)
 (b)
 (c)
 (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(c)

7) The wave length associated with an electron having kinetic energy 6 eV is; 1 point

- (a) 9A.U.
- (b) 5A.U.
- (c) 2.5A.U.
- (d) 1.5A.U.

- (a)
 (b)
 (c)
 (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(b)

8) An electron and a proton have the same de Broglie wave length. Then the kinetic energy of the electron is; 1 point

- (a) zero
- (b) infinity
- (c) equal to the kinetic energy of the proton
- (d) greater than the kinetic energy of the proton

- (a)
 (b)
 (c)
 (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(d)

9) A nucleus of mass 'M' at rest emits an α -particle of mass 'm'. The de Broglie wave lengths of the α -particle and residual nucleus will be in the ratio 1 point

- (a) m : M
- (b) (M+m) : m
- (c) M : m
- (d) 1 : 1

- (a)
 (b)
 (c)
 (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a)

10) The kinetic energy of an electron is the same as that of a photon of wave length 3100 A.U. What is the wave length of this electron?: 1 point

- (a) 4 A.U.
- (b) 5.4 A.U.
- (c) 6.1 A.U.
- (d) 7.6 A.U.

- (a)
 (b)
 (c)
 (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(c)

11) The rotation of plane of polarization is found to be greatest when: 1 point

- (a) Light travels along the lines of force of the magnetic field.
- (b) Light travels along perpendicular to the lines of force of the magnetic field.
- (c) Light travels at an angle 45 degree to the lines of the magnetic field
- (d) It is independent of the angle between the direction of light and direction of magnetic field lines.

- (a)
 (b)
 (c)
 (d)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(a)