PhysicsByAaryan

CSIR NET . GATE . JEST . BARC - Physics

Polarization - CSIR NET Physics PYQs

Optics . All PYQs (2015-2025) with answer key

5 questions . Answer key included

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Q1. [Dec 2015] . 3.5 marks

Optics > Polarization

CSIR NET	2015 Dec	3.5 M

A beam of unpolarized light in a medium with dielectric constant ϵ_1 is reflected from a plane interface formed with another medium of dielectric constant $\epsilon_2 = 3\epsilon_1$. The two media have identical magnetic permeability. If the angle of incidence is 60°, then the reflected light

1. is plane polarized perpendicular to the plane of incidence
2. is plane polarized parallel to the plane of incidence
3. is circularly polarized
4. has the same polarization as the incident light

Q2. [Dec 2016] . 3.5 marks

Optics > Polarization

CSIR NET	2016 Dec	3.5M

The electric field of an electromagnetic wave is $\vec{E}(z,t) = E_0\cos(kz+\omega t)\hat{\imath} + 2E_0\sin(kz+\omega t)\hat{\jmath}$, where ω and k are positive constants. This represents

1. a linearly polarised wave travelling in the positive z-direction
2. a circularly polarised wave travelling in the negative z-direction
3. an elliptically polarised wave travelling in the negative z-direction
4. an unpolarised wave travelling in the positive z-direction

Q3. [June 2019] . 3.5 marks

Optics > Polarization

CSIR NET	2019 June	3.5M

The permittivity tensor of a uniaxial anisotropic medium, in the standard Cartesian basis, is

$\begin{pmatrix} 4\varepsilon_0 & 0 & 0 \\ 0 & 4\varepsilon_0 & 0 \\ 0 & 0 & 9\varepsilon_0 \end{pmatrix}$ where ε_0 is a constant. The wave number of an electromagnetic plane wave polarized along the x-direction, and propagating along the y-direction in this medium (in terms of the wave number k_0 of the wave in vacuum) is

1. $4k_0$
2. $2k_0$
3. $9k_0$
4. $3k_0$

Q4. [June 2023] . 3.5 marks

Optics > Polarization

CSIR NET	2023 June	3.5M

A charged particle moves uniformly on the xy-plane along a circle of radius a centred at the origin. A detector is put at a distance d on the x-axis to detect the electromagnetic wave radiated by the particle along the x direction. If $d \gg a$, the wave received by the detector is

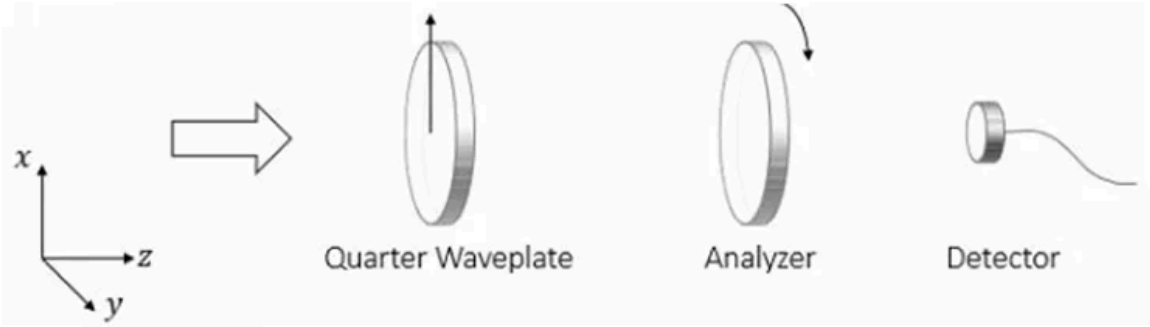
1. Unpolarised
2. circularly polarized with the plane of polarization being the yz-plane
3. linearly polarized along the y-direction
4. linearly polarized along the z-direction

Q5. [June 2025] . 5.0 marks

Optics > Polarization

CSIR NET	2025 June	5M	Optics

A beam of light along the z-axis passes through a quarter wave plate and an analyzer as shown in the figure. The fast axis of the quarter wave plate is aligned with the x-axis. The light intensity is measured by a detector placed after the analyzer. Consider two scenarios where the incident light beam is (a) circularly polarized and (b) linearly polarized along the x-axis. If the polarization axis of the analyzer is rotated by one full cycle about the z-axis, the number of times the detector measures the maximum intensity in each case would be



1. (a) 4 and (b) 0
2. (a) 2 and (b) 0
3. (a) 4 and (b) 4
4. (a) 2 and (b) 2

Answer Key

5 questions . Subject and topic for quick revision

Q. No	Subject	Topic	Answer
Q1	Optics	Polarization	**1**
Q2	Optics	Polarization	**3**
Q3	Optics	Polarization	**2**
Q4	Optics	Polarization	**3**
Q5	Optics	Polarization	**4**

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