

College of Engineering, Pune
Wellesley Road Shivajinagar Pune, Pune -05
2016-17 FYBTECH Physics I (Test I) (Set:M)

MIS NO. :	Semester : I
Name :	Division :
Serial number :	Marks : Max marks 20
Time : 30 Min.	Date : 10th September, 2016

Note :

- 1) Question 1 to 8 carry 1 mark each and Question 9 to 14 carry 2 marks each.
- 2) 25% marks will be deducted for wrong answer
- 3) All questions are compulsory.
- 4) Tick your answers with blue or black pen. (whitener not allowed)
- 5) ZERO marks will be given in case of cancellation or multiple ticks.

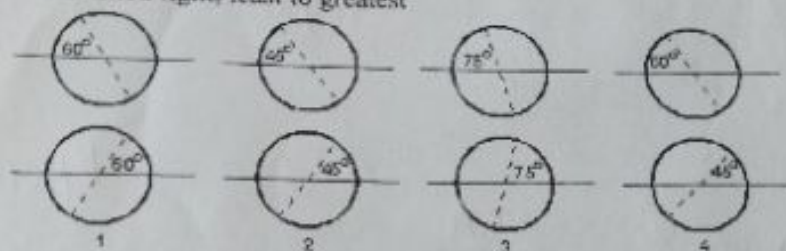
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- 1) What is the state of the polarization of the wave traveling in positive z-direction, when the x and y components of the electric field are given by

$$E_x = E_0 \sin(kz - \omega t), \quad E_y = \frac{1}{\sqrt{2}} E_0 \sin(kz - \omega t)$$

- a) circular b) unpolarized c) linear d) elliptical
- 2) When Linearly polarized light is passed through sugar solution,
- a) light splits into e ray and o- ray travelling with same velocity
 - b) light splits into perpendicular and parallel oscillations travelling with same velocity
 - c) State of polarization of emerging light is changed
 - d) None of the above
- 3) According to Fresnel's theory, if Left Circularly Polarized Light and Right Circularly Polarized Light are travelling with same velocities in the crystal, such crystal is called as
- a) optically active b) optically inactive
 - c) doubly refracting d) all of the above
- 4) Calculate the thickness of doubly refracting crystal which can produce the phase difference of 60°
 $\mu_e = 1.53$ and $\mu_o = 1.6$ and $\lambda = 5000 \text{ \AA}$
- a) $3.41 \times 10^{-5} \text{ cm}$
 - b) $11.9 \times 10^{-5} \text{ cm}$
 - c) $2.97 \times 10^{-5} \text{ cm}$
 - d) $5.95 \times 10^{-5} \text{ cm}$

- 5) Calculate the specific rotation if plane of polarization is rotated through 13.2° by 20 cm long, 10% sugar solution.
- 33 degree
 - 66 degree
 - 6.6 degree
 - 660 degree
- 6) In Newton's rings interference pattern, as the order of fringes increase the separation between rings
- goes on decreasing
 - goes on increasing
 - remains uniform
 - doubles for every next ring
- 7) The condition for destructive interference due to reflected light from wedge shape thin film ($\mu > 1$) of wedge angle θ is
- $2\mu t \cos r = m\lambda$
 - $2\mu t \cos r = (2m+1)\frac{\lambda}{2}$
 - $2\mu t \cos(r+\theta) = (2m+1)\frac{\lambda}{2}$
 - $2\mu t \cos(r+\theta) = m\lambda$
- 8) Fringe width of reflected interference pattern of wedge shaped film can be increased by
- Decreasing wavelength and refractive index
 - Increasing wavelength and refractive index
 - Decreasing wavelength and increasing refractive index
 - Increasing wavelength and decreasing refractive index
- 9) If light is reflected from glass surface ($\mu_g = 1.54$) which is kept inside oil ($\mu_o = 1.30$) then, angle of polarization will be equal to
- 62.81°
 - 51.04°
 - 49.80°
 - 47.16°
- 10) Unpolarized light with intensity I is incident on a series of polarizing sheets. The first sheet has its transmission axis oriented at 0° . A second polarizer has its transmission axis oriented at 90° and a third polarizer oriented with its axis at 45° . Determine the fraction of light intensity exiting the third sheet with and without the second sheet present respectively.
- $0.5I$, zero
 - zero, $0.25I$
 - $0.25I$, zero
 - zero, $0.5I$

- 11) The diagrams show four pairs of polarizing sheets, with the polarizing directions indicated by dashed lines. The two sheets of each pair are placed one behind the other and the front sheet is illuminated by unpolarized light. The incident intensity is the same for all pairs of sheets. Rank the pairs according to the intensity of transmitted light, least to greatest.



a) 3,1,4,2

b) 2,4,1,3

c) 2,4,3,1

d) 1,3,2,4

- 12) Quarter wave plate is fabricated for wavelength λ , for what wavelength same plate can work as Half wave plate?

a) λ

b) 3λ

c) $\lambda/2$

d) 2λ

- 13) If a region of a soap film ($\mu = 1.34$) surrounded by air, appears bright blue ($\lambda = 400$ nm), in normally reflected light, what is its minimum thickness?

a) 74.6 nm

b) 177 nm

c) 59 nm

d) 118 nm

- 14) In Newtons rings experiment the diameter of 5th ring changes from 1.80 cm to 1.17 cm when a drop of liquid is introduced between the lens and the glass plate. The refractive index of the liquid.

a) 1.56

b) 2.37

c) 1.75

d) 2.13