Seat No. [ ][ ][ ][ ][ ]

0785

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PHYSICS PAPER - II : PHY - 242
Optics
(New) (24126)

P. Pages : 3

Time : Two Hours

Max. Marks : 40

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks. Figures to the right indicates full marks.
5. Draw neat diagrams wherever necessary.
6. Use of logarithmic table or electronic calculator is allowed.

1. Attempt **any eight** of the following.   **8**

i) Deviation produced by a lens is independent of the ....
   a) focal length of lens   b) wavelength of light
   c) position of the object   d) None of the above

ii) Newtons rings are fringes of ....
   a) equal thickness   b) equal inclination
   c) unequal thickness   d) None of the above

iii) The condition for achromatism of two thin lenses of same material separated by a finite distance is ....

   a) $x = \dfrac{f_1 + f_2}{2}$ b) $x = \dfrac{w_1 f_2 + w_2 f_1}{w_1 + w_2}$

   c) $\dfrac{1}{f} = \dfrac{1}{f_1} + \dfrac{1}{f_2} - \dfrac{x}{f_1 f_2}$ d) $\dfrac{1}{f_1} + \dfrac{1}{f_2} = 0$

iv) To get bright fringes (constructive interference) in the reflected part, the path difference must be ....

   a) odd multiple of $\dfrac{\lambda}{2}$ b) even multiple of $\dfrac{\lambda}{2}$

   c) odd multiple of λ d) None of these

v) Polarimeter is an instrument used to measure........... of a substance.
   a) viscosity
   b) refractive index
   c) light intensity
   d) optical activity

vi) The bending of waves at the edges or corners of an obstacle is called........
   a) interference
   b) diffraction
   c) polarization
   d) refraction

vii) If V_e is velocity of an extra-ordinary light and Vo is velocity of an ordinary light in negative crystal then which of the following relation is correct.
   a) Vo > Ve
   b) Vo = Ve
   c) Vo ≥ Ve
   d) Ve > Vo

viii) The optical path difference in a thin film is ....
   a) $2\mu t \cos r - \dfrac{\lambda}{2}$
   b) $2\mu t \cos r + \dfrac{\lambda}{2}$
   c) $2\mu t \cos r + n\lambda$
   d) $2\mu t \cos r - n\lambda$

ix) In fresnel type of diffraction the source of light and the screen must be at a .... distances from the diffracting obstacle.
   a) finite
   b) infinite
   c) equal
   d) None of the above

x) Fringes obtained in wedge-shaped film are ....
   a) straight
   b) circular
   c) elliptical
   d) curved

2. Attempt **any four** of the following.   8

a) State the conditions for obtaining steady interferance pattern.

b) What is chromatic aberration ? state its types.

c) State any two applications of Newtons rings.

d) What is meant by fringes of equal thickness ?

e) State the Brewster's law.

f) Two thin lenses of focal length 10cm and 20cm are placed 5cm apart. Find the focal length of combination.

3.   Attempt **any two** of the following.   8

    a)   Prove the relation $\lambda = \dfrac{D_m^2 - D_n^2}{4\,(m-n)\,R}$ where symbols have their usual meaning.

    b)   Distinguish between Fresnel's diffraction and Fraunhoffer diffraction.

    c)   Give the construction and theory of quarter wave plate.

4.   a)   Attempt **any two** of the following.   6

    i)   Explain negative type of crystal.

    ii)   Explain rectalinear propagation of light.

    iii)   Obtain an expression for deviation produced by a thin lens.

    b)   Define optical activity of a substance.   2

5.   a)   Attempt **any one** of the following.   6

    i)   Obtain an expression for focal length of combination of two thin lenses separated by a finite distance.

    ii)   Give the theory of plane transmission grating.

    b)   Define the term plane polarized light.   2

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