April-2016

कांचन - 013

Seat Number

* 0 9 0 0 *

PHYSICS PAPER - II : PHY-242

Optics

(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. Graph or diagram should be drawn with the black ink 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.
5. Figures to the right indicates full marks.
6. Draw neat diagrams, wherever necessary.
7. Use of logarithmic table or electronic calculator is allowed.

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

i) A divergent lens is -------

a) Plano – convex
b) Double convex
c) Concavo – convex
d) Plano-concave

ii) In Michelson interferometer, if the two mirrors M_1 & M_2 are not perfectly perpendicular then -----

a) Circular fringes are observed.
b) Straight line fringes are observed.
c) Fringes are not observed.
d) None of these.

iii) The bending of light at the corners is called as ------

a) Interference
b) Diffraction
c) Polarization
d) None of these

iv) In negative crystal, the relation between velocity of extraordinary ray V_e and velocity of ordinary ray V_0 is -----

a) $V_e > V_0$
b) $V_e < V_0$
c) $V_e = V_0$
d) $V_e = \frac{1}{V_0}$

v) The condition for achromatism of thin lenses of same material separated by a finite distance is -----

a) $X = \frac{f_1 + f_2}{2}$ b) $X = \frac{f_1 - f_2}{2}$

c) $X = \frac{1}{f_1} + \frac{1}{f_2}$ d) $X = \frac{1}{f_1} - \frac{1}{f_2}$

vi) Newton's rings are fringes of --------

a) equal thickness b) unequal thickness

c) equal inclination d) equal chromatic order

vii) The resolving power of a grating is given by -----

a) $\frac{1}{\lambda}$ b) $\frac{\lambda}{d\lambda}$

c) $\lambda d\lambda$ d) $\frac{d\lambda}{\lambda}$

viii) Polarimeter is an instrument used for the study of ------

a) Optical activity b) Intensity of light

c) Refractive index d) None of these

ix) The unit in which the power of lens is measured is called as -------

a) Watt b) Diopter

c) Angstrom unit d) Centimeter

x) Instruments based on the principle of interference of light are known as -----

a) Polarimeter b) Interferometer

c) Diffractometer d) None of these

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

a) Give any two applications of Michelson interferrometer.

b) Draw ray diagram showing spherical aberration in lens.

c) What is the condition to obtain circular fringes in Michelson interferrometer?

d) What is meant by fringes of equal thickness.

e) Define the term plane of polarization.

f) What is diffraction grating.

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

a) Describe the experimental arrangement for producing Newton's ring.

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

c) Plane polarized light passes through a quarter plate. It's optic axis is parallel to the faces. Calculate the least thickness for the plate for which the emergent beam will be plane polarized.
Given : $\mu_e = 1.553$, $\mu_0 = 1.542$ and $\lambda = 5.5 \times 10^{-5}$ cm.

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

i) Draw a diagram showing arrangement of polarimeter.

ii) Explain negative type of crystal.

iii) Describe the condition of achromatism of two lenses of the same material separated by a finite distance.

b) State Brewster's Law. 2

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

i) Prove that the focal length of combination of 2 thin lenses of focal lengths f_1 and f_2 separated by a finite distance 'X' is given by
$$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} - \frac{x}{f_1 f_2}$$

ii) Describe Resolving power of grating with suitable diagram.

b) A shift of 100 circular fringes is observed when movable mirror of the Michelson interferometer is shifted by 2.95×10^{-3} cm. Calculate the wavelength of light. 2

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