Seat Number



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. Answer sheet should be written with black 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

The unit of power of lens is

a) Meter

b) Diopter

c) Candela

- d) Watt
- The condition for achromatism of two thin lenses of different materials separated by a finite distance is
 - a) $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} \frac{d}{f_1 f_2}$
- b) $\frac{w_1}{f_1} + \frac{w_2}{f_2} = 0$ d) $d = \frac{f_1 + f_2}{2}$
- c) $d = \frac{w_1f_2 + w_2f_1}{w_1 + w_2}$

iii) Interferometer works on the principle of

a) Diffraction

- b) Polarization
- c) Rectilinear propagation d) Interference

iv) Interference in Newton's rings experiment takes place by

- a) Division of amplitude
- b) Division of wave front
- c) Change of path
- d) None of the above

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	In a positive crystal the velocity of an extra-ordinary ray (v_e) isthan the velocity of ordinary ray (v_o) .				
		Less Equal	b) d)	Greater None of the above	
vi)	be a	Fraunhofer type of diffraction at distances from the Finite Infinite	diffra b)	ource of light and the screen must cting obstacles. Equal None of the above	
vii)	Polarization phenomenon is exhibited by a) Longitudinal waves b) Transverse waves only c) Both longitudinal and transverse waves d) None of the above				
viii)	The optical path difference in wedge-shaped film is				
	a)	$\mu t \cos (r + \theta)$	b)	$2\mu t \cos(r + \theta) - \frac{\lambda}{2}$	
	c)	$2\mu t \cos (r + \theta) - 3\frac{\lambda}{4}$	d)	$2\mu t \cos(r + \theta) + \frac{\lambda}{2}$	
ix)	In diffraction grating experiment intensity is maximum for order of diffraction pattern.				
	a)	First Third		Second Fourth	
x)	In Newtons ring experiment diameter of n th dark ring is given by				
4		$D_n = (2n+1)\lambda R$		$D_n = 4nR\lambda$	
	c)	$D_n^2 = (2n+1)\lambda R$	d)	$D_n^2 = 4nR\lambda$	
Atte	Attempt any four of the following.				
a)	Define the term plane polarized light and plane of polarization.				
b)	What is constructive and destructive interference.				
c).	Define spherical aberration, Name any two methods to reduce spherical aberration.				
d)	A grating has 15000 lines per inch. What is its grating element.				
e)	What is meant by fringes of equal inclination ?				

2.

- f) Calculate the power of combination of two thin lenses each of focal length 10 cm and placed 10 cm apart.
- 3. Attempt any two of the following.

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- a) Explain phase change on reflection using stokes treatment.
- b) Explain rectilinear propagation of light.
- c) Give the construction and theory of Half wave plate.
- 4. a) Attempt any two of the following.

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- i) State the types of fringes in Michelson interferometer. Explain the formation of circular fringes.
- ii) Explain positive type of crystal.
- iii) Explain plane polarized light and circularly polarized light.
- b) State any two applications of Michelson interferometer.

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5. a) Attempt any one of the following.

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- i) Define resolving power of grating. Describe with suitable diagram.
- ii) Two thin lenses of focal lengths f_1 and f_2 are separated by a distance d. Prove that the focal length of combination 'f' is given by $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} \frac{d}{f_1 f_2}.$
- b) Define achromatism. State the condition for achromatism of two thin lenses of focal length f₁ and f₂ and having dispersive powers w₁ and w₂ respectively.

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