



## **BRAINWARE UNIVERSITY**

## Term End Examination 2023-2024 Programme - B.Optometry-2022/B.Optometry-2023 **Course Name – Physical Optics Course Code - BOPTOC204** (Semester II)

Time: 2:30 Hours Full Marks: 60

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A 1 x 15=15 (Multiple Choice Type Question) 1. Choose the correct alternative from the following: (i) Which of the following phenomena proves that light is a transverse wave? b) Dispersion a) Interference c) Diffraction d) Polarization (ii) If the refractive index of water is 1.33, the polarizing angle of light reflected from the surface of a pond is given by b)  $\cot^{-1}(1.33)$ a)  $\cos^{-1}(1.33)$ d)  $\sin^{-1}(1.33)$ c)  $tan^{-1}(1.33)$ (iii) Radii of Newton's rings are proportional to b) square of natural number a) square root of natural number d) none of these c) natural number (iv) If interference takes place at some region, the light energy is b) created a) redistributed d) none of these c) destroyed (v) Two waves having intensities in the ratio of 9:1 produce interference. Calculate the ratio of maximum to minimum intensity. b) 9:1 a) 10:8 d) 2:1c) 4:1(vi) The intensity of central maximum due to double slit diffraction pattern is ----times greater than that of single slit pattern. b) 3 a) 2 d) 5 c) 4

(vii) In Fraunhoffer diffraction, the incident wave front is

	a) plane	d) arbitrary shape		
		s not depend on		
(viii)	c) cylindrical In lasing action, the spontaneous emission doe	h)		
	a) the number of atoms present in the excited	b) the intensity of the incident light		
	state	d) none of these		
(iv)	c) both intensity and number of atoms Select the color of the laser output in ruby lase	oth intensity and number of atoms  ect the color of the laser output in ruby laser from the following  b) blue		
	a) violet	b) blue		
	a) mad	d) green		
(x)	The ratio of Einstein's A and B coefficient is proportional to			
	a) <sub>v</sub>	b) <sub>v</sub> <sup>2</sup>		
	c) <sub>v</sub> <sup>3</sup>	d) 1/v		
	Write the S.I unit of Luminance			
, ,	a) Candela	b) Lux		
	c) Candela/m <sup>2</sup>	d) Candela/m		
	Lux is equal to			
	a) 1 lumen/m <sup>2</sup>	b) 1 lumen/cm2		
		d) 1 candela/cm <sup>2</sup>		
/ <b>.</b>	c) 1 candela/m <sup>2</sup>			
(xiii) Which of the following colors is least scattered by fog, dust of smoke?  a) Violet  b) Blue				
	a) Violet c) Red	d) Yellow		
(xiv)	Which of the following is used for the formati			
	a) X-ray	b) Visible Light		
	c) Infrared	d) Laser light		
(xv)	In holography we record			
;	a) both the phase and intensity from the	b) only the phase of different parts of	the	
	different parts of the three dimensional	object	1110	
	object	· · · · · · · · · · · · · · · · · · ·		
(	c) only the intensity from the different parts of the object	d) none of these		
	of the object			
	Grou	р-В		
	(Short Answer Ty	•	3 x 5=15	
2. Sho	ow that the energy is conserved in interference		(3)	
2 Wr	ite down the conditions of the Tyndall effect.		* ***	
5. WI	ne down the conditions of the Tyndan cheet.		(3)	
4. Calculate the refractive index of glass if the light of 550 nm wavelength is completely (3				
	ne polarized when reflected at an angle of $60^0$		, ,	
5. The	e colour of the sky is blue. Explain the reason,			
	c colour of the sky is olde. Explain the reason,	· man Make	(3)	

	Stimulated emission is used in laser action instead of spontaneous emission. Justify your answer.	(3)	
	OR Distinguish between ordinary light and laser light.	(3)	
	<b>Group-C</b> (Long Answer Type Questions)	5 x 6=30	
7.	State and explain the inverse square law as applied in photometry.	(5)	
8.	Classify different types of scattering of light.	(5)	
9.	Explain the process to reconstruct of the image from a hologram.	(5)	
	Derive the intensity due to single slit Fraunhofer diffraction.	(5)	
11. An unpolarized light of intensity $I_0$ is incident on two perfect linear polarizers oriented at (5) 45° with each other. Estimate the intensity of the transmitted light.			
13	12. Calculate the ratio of population inversion of the two states in thermal equilibrium at 300 (5) K. The wavelength corresponding to the energy gap between the two states is 600 nm.		
	In a He- Ne laser transition from $E_3$ to $E_2$ level gives a laser emission of wavelength 632.8 nm. If the energy of the $E_2$ level is $15.2 \times 10^{-19}$ J, Calculate the required pump energy, if there is no energy loss in He- Ne laser.	(5) ing	