Avinashilingam Institute for Home Science and Higher Education for Women

Deemed to be University Estd. u/s 3 of UGC Act 1956, Category 'A' by MHRD (now MoE)
Re-accredited with 'A++' Grade by NAAC. CGPA 3.65/4, Category I by UGC
Coimbatore - 641 043, Tamil Nadu, India

Bachelor's Degree Arrear Examination – May 2025
I Semester

Batch : 2024 **Time: 3 Hours**
Major : Optometry **Max. Marks: 100**

22BOPC04 Physical Optics

Course Outcomes:
CO1 : To recollect the knowledge on various theories and components of light.
CO2 : To perceive the effect of interference and diffraction of light on lenses.
CO3 : To examine the polarization and scattering properties of light on lenses.
CO4 : To evaluate the role of Fluorescence, Phosphorescence, radiometry and photometry in Optometry.
CO5: To scrutinize the role of Lasers in Optometry

Part A **10 x 1= 10**
Choose the Correct Answer

1. What is the nature of light according to Maxwell's theory? CO1 K1
   a. Longitudinal wave b. Electromagnetic oscillation
   c. Particle wave d. None of the above

2. Which of the following is an example of a coherent light source? CO1 K1
   a. LED b. Sunlight
   c. LASER d. Fluorescent dye

3. In Young's double-slit experiment, the fringe width depends on CO2 K1
   a. Wavelength of light b. Slit separation
   c. Distance to the screen d. All of the above

4. Brewster's angle is an angle in which the light is CO2 K1
   a. completely absorbed b. completely polarized
   c. reflected d. totally reflected

5. Which of the following is not a photometric unit CO3 K1
   a. Lumen b. Candela
   c. Lux d. Watt

6. Fluorescence differs from phosphorescence in that CO3 K1
   a. Fluorescence lasts longer
   b. Phosphorescence involves immediate emission
   c. Fluorescence occurs only in solids
   d. Fluorescence emission stops immediately after excitation

7. The condition necessary for laser action is CO4 K1
   a. Absorption b. Population inversion
   c. Spontaneous emission d. None of the above

8. The resolving power of an optical instrument depends on CO4 K1
   a. Wavelength of light b. Numerical aperture
   c. Diameter of the lens d. All of the above

9. Which of the following is a gas laser CO5 K1
   a. Ruby laser b. He-Ne laser
   c. Semiconductor laser d. Nd:YAG laser

10. Holography is based on CO5 K1
   a. Reflection of light b. Diffraction of light
   c. Interference of light d. Refraction of light

Part B **5 x 6 = 30**

Answer ALL questions

Each answer should not exceed 400 words or two pages

11.a. Explain the transverse nature of electromagnetic waves with a diagram.	CO1 K3
(or)	
11.b. Discuss the different sources of light and their characteristics.	CO1 K2
12.a. Derive an expression for the fringe width in Young's double-slit experiment.	CO2 K3
(or)	
12.b. Explain the concept of coherence and its types with examples.	CO2 K2
13.a. State and explain Malu's law for polarization of light.	CO3 K2
(or)	
13.b. Differentiate between Rayleigh and Tyndall scattering.	CO3 K2
14.a. Explain the inverse square law of photometry and Lambert's law.	CO4 K3
(or)	
14.b. Discuss the applications of fluorescence in angiography.	CO4 K4
15.a. Explain Einstein's theory of stimulated emission and its role in lasers.	CO5 K2
(or)	
15.b. Describe the working principle and applications of the Excimer laser	CO5 K2

Part C **5 x 12 = 60**

Answer ALL questions

Each answer should not exceed 800 words or four pages

16.a. Explain electromagnetic waves and explain its significance.	CO1 K2
(or)	
16.b. Explain the sinusoidal oscillations and their importance in wave optics.	CO1 K2
17.a. Describe in detail the phenomenon of Newton's rings and its applications.	CO2 K4
(or)	
17.b. Discuss the Rayleigh criterion for resolving power and its significance in optical instruments.	CO2 K2
18.a. Explain in detail the methods used to produce polarized light.	CO3 K2
(or)	
18.b. Describe the working principle and application of Polaroid glasses.	CO3 K2
19.a. Define and explain the different photometric units used in light measurement.	CO4 K2
(or)	
19.b. Discuss the concept of retinal illumination and the role of Trolands in Optometry.	CO4 K2
20.a. Explain the working of the Helium-Neon laser with a neat diagram.	CO5 K2
(or)	
20.b. Discuss the application of LASIK in ophthalmology and its advantages.	CO5 K2

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