

**S.Y.B.SC. SEM – III (2014 Course) : WINTER - 2018**

**SUBJECT : PHYSICS : OPTICS (P – 32)**

Day : Saturday  
Date : 13/10/2018

**W-2018-0801**

Time : 12.00 NOON TO 02.00 PM  
Max. Marks : 40

**N.B.:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw diagrams **WHEREVER** necessary.
- 4) Use of scientific **CALCULATOR** is allowed.

**Q.1** Answer **ANY TWO** of the following: [10]

- a) State and explain Rayleigh's criterion of resolution.
- b) Two thin convex lenses each of focal length 10 cm are placed co-axially at a distance of 10 cm apart. Calculate the equivalent focal length of given combination of lenses and locate the cardinal points.
- c) What is a retardation plate? Explain its types with necessary diagrams.

**Q.2** Answer **ANY TWO** of the following: [10]

- a) Explain the working of a simple microscope and obtain an expression for magnifying power under different conditions:
  - i) Image at distance of distinct vision.
  - ii) Image at infinity.
- b) Explain the phenomenon of interference in parallel sided thin film due to transmitted light. Obtain the expression for maxima for transmitted rays.
- c)
  - i) Explain the principle of laser.
  - ii) Explain the following terms for laser:
    - i) Optical pumping
    - ii) Stimulated emission
    - iii) Population inversion

**Q.3** Answer **ANY TWO** of the following: [10]

- a) Explain the construction of Ramsden's eye-piece. Why is it termed as a positive eye-piece?
- b) Derive lens maker's formula for a thin lens.
- c) Explain the experimental setup for Newton's rings and prove the relation

$$\lambda = \frac{D_m^2 - D_n^2}{4(m-n)R}$$

**Q.4** Answer **ANY FIVE** of the following: [10]

- a) State Brewster's law.
- b) Give two points of difference between Fresnel's diffraction and Fraunhofer's diffraction.
- c) State any two applications of laser.
- d) Give two points of difference between interference and diffraction.
- e) Define positive and negative crystals. Give one example for each.
- f) The polarizing angle for air and transparent material is  $60^\circ$ . Calculate refractive index of material. What is the angle of refraction in the medium?
- g) A parallel beam of light of wavelength  $6000\text{\AA}$  is used for obtaining Newton's rings in the reflected light. Determine the radius of 4<sup>th</sup> dark ring if the radius of curvature of the plano-convex lens is 80 cm.

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