Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.OPTM/SEM-2/BO-201/2011

2011

PHYSICAL OPTICS – II

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) Polarization is not seen with sound, because the waves are

      a) longitudinal

      b) transverse

      c) not electromagnetic waves

      d) of long wavelength.

   ii) If monochromatic light falls on Young's double slit, the central fringe

      a) disappears b) is coloured

      c) is white d) changes position.

iii) Which of the following phenomena proves the transverse nature of light ?

a) Dispersion b) Polarization

c) Interference d) None of these.

iv) Light wave is

a) a radio wave

b) an elastic wave

c) an electromagnetic wave.

v) In fraunhoffer diffraction, the incident wavefront is

a) Plane b) Spherical

c) Cylindrical d) None of these.

vi) Young's experiment establishes that

a) light consists of wave

b) light consists of particles

c) light is neither particle nor wave

d) light is both particle and wave.

vii) Polaroid glass is used in sunglass because

a) it reduces light intensity to half

b) it is cheaper

c) it has good colour

d) it is fashionable.

viii) Newton postulated his corpuscular theory on the basis of

a) Newton's rings

b) Rectilinear propagation of light

c) Dispersion of white light into colours

d) Colour of thin film.

ix) The transverse nature of light is shown by

a) interference of light b) refraction of light

c) polarisation of light d) dispersion of light.

x) Wavelength of a LASER beam can be used as a standard of

a) Time b) Temperature

c) Angle d) Length.

xi) Diffraction pattern is obtained from a wire. With the increase in the diameter of the wire, the fringe width

a) decreases

b) increases

c) remain the same

d) first decreases, then increases.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

2. Write short note on Hologram.
3. Write short note on Anti-reflection coating.
4. Write short note on Coherent sources.
5. How can you distinguish — Plane polarized, circularly polarized and unpolarised light from a light under test ?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

6. Define wave front ? Compare between corpuscular theory and wave theory. State Huygens' principle. Obtain the laws of reflection of plane wave front at plane surface on the basis of wave theory of light. 2 + 3 + 2 + 8

7. What are coherent sources of light ? Establish the relationship between phase difference and path difference. State the condition of permanent interference of light. Derive the condition for constructive & destructive interface from the analytical treatment of interference of light. 2 + 2 + 3 + 8

8. Distinguish between plane, circular, elliptical polarization. Explain the construction and working of ruby laser. State Brewster's law. Find the angle of polarization of light for the material of RI 1.5. 5 + 6 + 2 + 2

9. i) Explain the difference betwen Newton's rings formed by transmission & reflection, respectively.

   ii) State Brewster's law.

   iii) Given that the refractive index of water is 1.33 with respect to air, calculate the Brewster angle for light incident on

      a) water surface from air

      b) from inside the water.

   iv) Also find the angle of refraction in each cases when light is incident at the Brewster angle. 3 + 3 + 6 + 3