B.Sc. (Part—II) Semester-IV Examination

PHYSICS

Time : Three Hours] [Maximum Marks : 80

Note :— (1) All questions are compulsory.

(2) Draw neat and well labelled diagrams wherever necessary.

1. (a) Fill in the blanks :

(i) Nodal points are the points having unit positive _____.

(ii) Bending of light waves at the edges of obstacle is called _____.

(iii) Numerical aperture is defined as the sine of the _____.

(iv) The instrument used to measure the solar radiation flux is called _____. 2

(b) Choose the correct alternatives :

(i) For a co-axial lens system the number of cardinal points are :

(a) 4 (b) 6

(c) 2 (d) 1

(ii) If i is the polarising angle, then refractive index μ of the material is given by :

(a) sin i (b) cos i

(c) tan i (d) cosec i

(iii) The SI unit of radiation is :

(a) Cal cm^{-2} min^{-1} (b) Cal

(c) Wm^{-2} (d) Watts

(iv) Ruby laser is :

(a) Semiconductor laser (b) Solid state laser

(c) Gas laser (d) Liquid laser 2

(c) Answer in **one** sentence each :

(i) Define interference of light.

(ii) State the types of diffraction.

(iii) What is pumping in laser system ?

(iv) Define critical angle. 4

EITHER

2. (a) What is wedge shape thin film ? Explain the interference in wedge shaped thin film. 5

(b) Derive an expression for Fringe width in case of wedge shaped air film. 4

(c) Two thin lenses of focal lengths 10 cm and 20 cm are placed 5 cm apart. Find the equivalent focal length. 3

OR

3. (p) Describe the necessary theory for determination of the wavelength of monochromatic light by using Newton's rings. 6

(q) How the Newton's rings can be used to determine the refractive index of liquid ? Derive the necessary formula. 6

EITHER

4. (a) Derive an expression for resultant intensity due to complete wavefront in case of Fresnel's half period zone. 6

(b) What are Fresnel's half period zone ? Determine the area of half period zone. 6

OR

5. (p) Explain Rayleigh's criteria of regulation. 4

(q) What is zone plate ? How is it constructed ? What is the principle of zone plate ? 6

(r) A plane diffraction grating has 14000 lines per inch. Find the wavelength of the monochromatic light used, if the first order maximum is obtained at an angle of 20°. 2

EITHER

6. (a) Give the construction of Nicol Prism. 4

(b) What is quarter wave plate ? Deduce the formula for its thickness. 4

(c) Explain how circularly polarized light is produced. 4

OR

7. (p) Describe the construction and working of Half shade polarimeter. 6

(q) Distinguish between positive and negative crystals. 3

(r) Explain why sky is blue. 3

EITHER

8. (a) What is LASER ? State its properties. 4

(b) Describe the construction and working of He-Ne LASER. 6

(c) What is MASER ? Give its working principle. 2

OR

9. (p) Explain the construction and working of semiconductor LASER. 6

(q) What are the main parts of LASER system ? 3

(r) What is holography ? How is it constructed ? 3

EITHER

10. (a) Explain how light is propagated in optical fiber. 4

(b) Derive an expression for numerical aperture of step index fiber. 5

(c) An optical fibre has an acceptance angle of 30° and refractive index for core = 1.5. Calculate the refractive index of cladding. 3

OR

11. (p) Mention the advantages of optical fiber over conventional communication system. 4

(q) Explain the structure of optical fiber. 2

(r) State and explain different types of optical fiber. 6

EITHER

12. (a) Explain how solar radiation flux is measured. 6

(b) Describe the different methods to store solar energy. 6

OR

13. (p) Explain the flat plate types of solar collectors. 6

(q) What is the hydrogen energy ? State its advantages. 4

(r) What is solar constant ? 2