Fourth Semester B. Sc. (Part - II) Examination

4S–PHYSICS

(Optics, Laser and Renewable Energy Sources)

P. Pages : 7

Time : Three Hours] [Max. Marks : 80

Note : (1) All questions are compulsory.
(2) Draw neat and labelled diagram wherever necessary.

1. (A) Fill in the blanks :—

(i) The central spot of Newton's rings by transmitted light is ————.

(ii) In Fresnel diffraction the light source is at ———— distance from obstacle.

(iii) ——— pumping is used in ruby LASER.

(iv) Wind energy is the indirect manifestation of ———— energy. 2

(B) Choose, correct alternative :—

(i) The main components of any LASER system are ————

(a) Active media.

(b) Resonator cavity.

(c) Pumping source

(d) All of these.

(ii) Zone plate behaves like a———

(a) Concave lens

(b) Concave mirrior

(c) Convex lens

(d) Convex mirrior.

(iii) How much phase change occurs when reflection takes place from the surface of denser medium ?

(a) π (b) $\pi/2$

(c) Zero (d) 2π

(iv) Which species of atom emit laser in He–Ne laser.

(a) Helium

(b) Neon

(c) Both a and b

(d) None of these. 2

(C) Answer in **one** sentence :—

(i) What is renewable energy ?

OR

13. (p) Explain the construction and working of solar photovoltaic panel. 4

(q) State any four applications of solar photovoltaic panel. 4

(r) Explain working of solar concentrating collectors. 4

EITHER

10. (a) Explain total internal reflection. 3

(b) Explain single mode and multimode step index fiber. 4

(c) Draw a block diagram of fiber optical communication system and explain each block. 5

OR

11. (p) Explain how light is propagated in optical fibre. 6

(q) State the advantages of optical fibre communication system over conventional communication system. 3

(r) State the applications of optical fibre. 3

EITHER

12. (a) Describe different methods to store solar energy. 6

(b) Explain solar constant. 3

(c) Explain the biomass energy. 3

(ii) State the principle of the superposition of light ?

(iii) What is wedge shaped thin film ?

(iv) What is optical fibre ? 4

EITHER

2. (a) Determine the equivalent focal length of two thin coaxial lenses of focal lengths f_1 and f_2 seperated by a distance 'a'. 6

(b) Derive an expression for the diameter of n^{th} dark and bright Newton's rings due to reflected light. 6

OR

3. (p) Explain the phenomenon of interference in the thin films of uniform thickness due to reflected light. 6

(q) Describe the experiment to determine the wavelength of monochromatic light by using Netwton's rings. 6

EITHER

4. (a) Give the construction and elementary theory of grating. 6

(b) What is resolving power of an optical instrument ? 2

(c) A grating with 3000 lines per cm is illuminated at normal incidence by light of wave length 6600A^0. How many orders of maxima will be visible ? 4

OR

5. (p) Explain the Fraunhofer diffraction of light due to double slit. 6

(q) What is zone plate ? Give its construction. 6

EITHER

6. (a) Give the construction and working of Laurent's half shade polarimeter. 6

(b) Explain plane, circularly and elliptically polarized light. 6

OR

7. (p) Explain double refraction. 3

(q) What is quarter wave plate and half wave plate ? 4

(r) Explain how Nicol prism acts as polariser. 5

EITHER

8. (a) Give the construction and working of Helium–Neon LASER. 6

(b) Explain the spontaneous emission and stimulated emission. 4

(c) Explain population inversion. 2

OR

(p) State the characteristics of Laser. 2

(q) Explain the construction and working of Ruby Laser. 6

(r) Give the applications of laser in medical and industrial field. 4