AQ—696

B.Sc. (Part—II) Semester-IV Examination
4S : PHYSICS

Time—Three Hours] [Maximum Marks—80

N.B. :— (1) All questions are compulsory.

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

1. (A) Fill in the blanks :

(i) The rising and falling of the sea which happens twice a day is called _____.

(ii) Ruby is made up of aluminium oxide containing small percentage of _____ atoms.

(iii) A device used for focusing light waves by diffraction phenomenon is called _____.

(iv) Half wave plate introduces a phase difference of _____ between ordinary rays and extra-ordinary rays. 2

(B) Choose correct alternative :

(i) Bending of light around an obstacle is known as :

(a) Refraction

(b) Reflection

(c) Diffraction

(d) Total internal reflection

(ii) In He-Ne laser, mixture of helium and neon is the ratio of about :

(a) 1 : 10

(b) 10 : 1

(c) 1 : 1

(d) None of these

(iii) Polarization is the phenomenon which proves the :

(a) Longitudinal nature of light

(b) Transverse nature of light

(c) Quantum nature of light

(d) All the above

EITHER

12. (a) What are the advantages of solar cell ? 2

(b) Explain :

(i) Geothermal energy (ii) Wind energy. 4

(c) Describe principle, construction and working of a solar cell. 6

OR

13. (p) Describe construction and working of photovoltaic cell. 5

(q) Explain Solar energy and Ocean energy. 5

(r) What is Solar radiation ? 2

OR

9. (p) Explain Population inversion. 2

(q) Explain the main parts of laser system. 4

(r) Describe construction and working of He-Ne laser. 6

EITHER

10. (a) Explain with neat diagrams step index fiber and graded index fiber. 5

(b) What are the different types of losses in optical fiber and explain each. 3

(c) What is optical fiber ? Explain the structure of optical fiber. 4

OR

11. (p) What is critical angle ? Show that $\theta_c = \sin^{-1}\frac{1}{n}$. 3

(q) How propagation of light takes place in optical fiber ? 4

(r) Derive an expression for acceptance angle and numerical aperature in Fibre optics. 5

(iv) Propagation of light through Fiber depends on the phenomenon of light known as :

(a) Reflection

(b) Refraction

(c) Total internal reflection

(d) Diffraction. 2

(C) Answer in **one** sentence :

(i) Define interference of light.

(ii) Define Wind.

(iii) What is grating element ?

(iv) What is pumping in LASER system ? 4

EITHER

2. (a) Describe how the wavelength of monochromatic light can be determined by using Newton's ring. 6

(b) Obtain an expression for path difference in the interference in thin films due to transmitted light. Hence also obtain the condition for bright and dark fringes. 6

OR

3. (p) What are Newtons Rings ? Describe the experimental arrangement to obtain it. 5

(q) Define power of lens and state its unit. 1

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

EITHER

4. (a) Describe with necessary theory the Fraunhofer diffraction due to a double slit. 6

(b) A plane diffraction grating has 14000 lines per inch. Find the wavelength of the monochromatic light used if the first order maxima is obtained at an angle of 20°. 3

(c) Show that the radii of Fresnel's half period zone are directly proportional to the square roots of the natural number. 3

OR

5. (p) What is plane diffraction grating ? 2

(q) Explain the construction and elementary theory of plane diffraction grating. 6

(r) What is zone plate ? How it is constructed ? 4

EITHER

6. (a) What is Polarization ? 2

(b) Explain how Nicol Prism can be used as an analyser. 4

(c) State and explain phase retardation plate. Deduce the formula for thickness of quarter wave plate. 6

OR

7. (p) Explain polarization by double refraction. 3

(q) Calculate the thickness of half wave plate.

Given :

$\lambda = 5000$ Å, $\mu_e = 1.553$, $\mu_o = 1.544$. 2

(r) Give the principle and construction of Nicol Prism. 4

(s) Define :

(i) Plane of polarization

(ii) Plane of vibration

(iii) Optic axis. 3

EITHER

8. (a) Explain four level laser system. 4

(b) Describe the construction and working of semiconductor laser. 5

(c) What is hologram ? How is it constructed ? 3