M.Sc. Physics 4th Semester
1059
FIBRE OPTICS AND NON-LINEAR OPTICS
Paper–PHY-7054

Time Allowed : 3 Hours]   **[Maximum Marks : 60**

Note :–   Attempt **five** questions in all taking **one** question each from Units I-IV and compulsory question from Unit-V.

UNIT–I

1.   (a)   Using core, cladding ratio, how does one distinguish different type of optical fibers.   6

      (b)   Name and describe three types of dispersion. How do they effect the propagation of signal ?   6

2.   (a)   Describe typical cable design.   6

      (b)   Describe optical fiber mass production procedures.   6

UNIT–II

3.   (a)   How do monochromatic plane waves propagate in anisotropic media ?   6

(b) What are the angular relationships between the following quantities, $\vec{D}, \vec{E}, \vec{H}, \vec{k}$ and the Poynting vector $\vec{S}$ where the symbols have their usual meaning ? 6

4. (a) Explain how, PWA (polarizer, waveplate, second polarizer) combination serves as an adjustable attenuator. 6

(b) Discuss, what happens when a linearly polarized wave of arbitrary polarization direction enters an anisotropic medium. 6

UNIT–III

5. (a) Describe linear electro-optic effect. 6

(b) How amplitude and phase of light beam can be manipulated? Explain. 6

6. (a) What is quadratic Kerr effect ? Explain. 6

(b) Describe working and one application of Acousto-optic modulator. 6

UNIT–IV

7. (a) Describe second harmonic generation process in nonlinear optics ? 6

(b) What kind of symmetries do nonlinear susceptibility coefficients obey in general ? 6

8. (a) What is self-focusing phenomenon in nonlinear optics ? 6

(b) What is parametric amplification ? Explain. 6

UNIT–V

9. (a) What is the relation between total dispersion and bit rate?

2

(b) How does one perform optical tests for checking optical fibre ? 2

(c) What is Raman-Nath diffraction ? 2

(d) Which absorption process causes most problems in the production of fiber optic cable processes ? Why ? 2

(e) What is Jones matrix ? 2

(f) What are Biaxial crystals ? 2