APRIL/MAY 2019

MPSL24C — NONLINEAR OPTICS

Time : Three hours Maximum : 75 marks

SECTION A — (5 × 6 = 30 marks)

Answer ALL questions.

1. (a) With neat diagram, explain the working of Nd : YAG laser.

Or

(b) Give construction and application of diode laser.

2. (a) Discuss the wave propagation in an anisotropic crystal.

Or

(b) Define and explain sum and difference frequency generation in nonlinear optics.

3. (a) Write the significant role of the following in multiphoton processes:

(i) Oscillator and (ii) Amplifier.

Or

(b) Outline the following:

(i) Photorefractive effects and

(ii) Electro-optic effects.

4. (a) Give a brief account on FT-NMR.

Or

(b) Write short notes on urea and nitro aniline based NLO materials.

5. (a) Define and explain the following:

(i) Numerical aperture and

(ii) Inverse square law losses.

Or

(b) Give comparison between the single mode fibers and multimode fibers.

SECTION B — (3 × 15 = 45 marks)

Answer any THREE questions.

6. Describe the following gas lasers with necessary diagram:

(a) He-Ne laser and

(b) Argon ion laser. (10+5)

7. Outline the following:

(a) Frequency dependent and intensity dependent refractive index

(b) Phase matching and

(c) Third harmonic generation. (7+4+4)

8. Discuss theory and experiment of three photon process of parametric generation of light in detail.

9. (a) Explain laser induced surface damage threshold in detailed manner.

(b) Give principle of Kurtz-Perry powder SHG test. (11+4)

10. Discuss following optical fiber losses in brief:

(a) material absorption losses

(b) bending losses and

(c) core and cladding losses. (5+5+5)