C 22112 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER M.Sc. DEGREE EXAMINATION, JUNE 2017

(CUCSS)

Physics

PHY 4E 18—MODERN OPTICS

(2012 Admissions)

Time : Three Hours Maximum : 36 Weightage

Part A

Answer **all** *questions.*

Each question carries a weightage of 1.

1. Write down Jones vector for a half wave plate.
2. Derive matrix for reflection.
3. Discuss the relation of temporal coherence to spectral width.
4. Elaborate on interference by division of amplitude and division of wave-front.
5. State the advantage of using multiple beam interferometer.
6. How does lens act as a Fourier transformer ?
7. Distinguish between real time and double exposure holograms.
8. Discuss on high pass, low pass and band pass filters.
9. Explain optical kerr effect and its applications.
10. What is second harmonic generation ? Why do crystals libe NaCl do not exhibit SHG ?
11. Write down the significance of phase matching in SHG.
12. Explain normal and anomalous dispersion.

(12 × 1 = 12 weightage)

Part B

Answer any **two** *questions.*

Each question carries a weightage of 6.

1. Show that the addition of 2 elliptical polarized waves propagating in a direction results in another elliptical polarized wave.
2. Describe the construction, principle and production of interference fringes with Fabry-Perot interferometer. Discuss intensity distribution of fringes and find the ratio of I_{max} to I_{min}.

Turn over

3. Explain the physical origin of nonlinear polarization.

4. Discuss diffraction pattern produced by grating and obtain resolving power of grating.

(2 × 6 = 12 weightage)

Part C

Answer any **four** *questions.*
Each question carries a weightage of 3.

1. Using Jones calculus obtain Malus Law.

2. Distinguish between negative and positive crystals.

3. Explain the working and principle behind Hanbury-Brown Twiss intensity interferometer.

4. What is frequency mixing. Outline the concept of optical parametric amplification.

5. Discuss the theory of spatial filtering.

6. Explain how holograms give 3D view of images.

(4 × 3 = 12 weightage)