25072

M.Sc. DEGREE EXAMINATION, APRIL 2018.

PHYSICS

SECOND SEMESTER

Paper II — ELECTROMAGNETIC THEORY, LASERS AND MODERN OPTICS

Time : Three hours Maximum : 75 marks

(No additional sheet will be supplied)

PART A — (5 × 3 = 15 marks)

Answer any FIVE questions.

Each question carries 3 marks.

Each answer should not exceed 1 page.

1. Give an account on the differential and integral form of Maxwell's equation.

2. Derive the expressions for Lienard-Wiechert potentials.

3. Write a brief note on threshold condition for laser action.

4. Explain the principle of parametric light oscillator.

5. Establish a Parasevels formula.

6. Explain what is Auto correlation.

7. Explain optical fibers in communication system and medicine.

8. Explain the phenomenon of total internal reflection and why this phenomenon is used to transmit light waves in optical fibers.

PART B — (4 × 15 = 60 marks)

Answer ALL questions.

Each question carries 15 marks.

Each answer should not exceed 6 pages.

9. Derive the expressions for the intensity of reflected and transmitted wave at the boundary of a dielectric interface.

Or

10. Discuss the radiation from moving point charge and oscillating dipole.

11. Why population inversion is necessary for laser action? Explain in detail principle and working of Ga As laser.

Or

12. Explain what is meant by phased matching. Explain in detail about second harmonic generation.

13. Explain the concept of Speckle pattern and discuss different applications of holography.

Or

14. Discuss Fraun hoffer diffraction by single slit using Fourier method and Prove that Fourier transform of a convolution is the product of the Fourier transforms.

15. Describe one method for fabrication of optical fiber and give an account on modes and configuration of optical fibers.

Or

16. Discuss attenuation losses and signal distortion in optical wave guides and describe Erbium doped fiber amplifiers.

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