

M.Sc. DEGREE EXAMINATION, May 2015

(PHYSICS)

(FIRST YEAR)

130: ELECTROMAGNETIC THEORY AND MODERN OPTICS

Time: Three hours

Maximum: 100 marks

SECTION-A

(5×4=20)

Answer any FIVE questions

1. Why does Ampere's law need to be modified?
2. Explain the concept of dispersion and their types.
3. Write a short note on scattering of electro-magnetic waves.
4. Discuss the Babinet's principle.
5. Explain how the Laser differ from ordinary light sources.
6. List out the applications of laser.
7. Explain the principles of fibre optic communication.
8. What is holography? List out its applications.

SECTION-B

(5×16=80)

Answer any FIVE questions

9. a) Derive the continuity conditions for electric and magnetic fields at the interface of two media.
b) Explain in detail the physical significance of Maxwell's equations.
10. Obtain the expressions for the reflection and transmission co-efficients when a plane polarised wave is incident on an interface of two dielectrics.
11. Describe the Fabry-Perot interferometer with neat diagram and obtain the expression for its resolving power.
12. Discuss the Fraunhofer diffraction from rectangular and circular apertures with necessary theory.
13. What is the principle of Laser? Derive Einstein's relation for stimulated emission and explain the existence of stimulated emission.
14. Explain with neat diagram the principle, construction and working of CO₂ Laser. Also give their advantages, disadvantages and applications.
15. Explain the principle of total internal reflection. Derive an expression for acceptance angle and Numerical aperture of a fibre.
16. Distinguish between step index and graded index fibres. Explain the various losses involved in the transmission of signals through the fibres.
