



Date: 04-05-2018

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

PART A

Answer **ALL** the questions:

10 x 2 = 20

1. Which of the following sources produce chromatic aberration in lenses? Why?
Hydrogen lamp, Mercury Source, He –Ne Laser
2. Green ray deviates more than violet and blue ray. Is it true? Justify.
3. Mention the merits of reflective and antireflective coatings.
4. Two electromagnetic waves of amplitudes 'a' and 'a' constructively interfere with each other. What is the Intensity of the resultant wave produced?
5. How a grating is constructed?
6. What is a zone plate? In what way is it different from a convex lens?
7. For a wavelength of 540 nm, if the difference between μ_e and μ_o is 0.009, what is the thickness of the half wave plate of quartz to be used?
8. State Brewster's law
9. What are Einstein's coefficients?
10. What is Pockel effect?

PART - B

Answer any **FOUR** questions

4 x 7.5 = 30

11. What is 'Spherical Aberration' in lenses? Explain four methods of minimizing spherical aberration
12. Explain the methodology of determining the thickness of a thin wire using interference technique
13. Derive the expression for the resolving power of a telescope.
14. Discuss the construction of a Nicol prism with suitable diagram
15. What are metastable states, optical pumping and population inversion in laser action?

16. a) Explain interference in thin films due to reflected light.
- b) The width of the fringes obtained on a screen kept at a distance 80 cm from a biprism is 9.424×10^{-8} cm. What is the distance between the two coherent sources if the wave length of sodium light used is 5890 \AA ?

PART C

Answer any **FOUR** questions:

4 x 12.5 = 50

17. What are Achromatic Prisms? Deduce the condition for combining two thin prisms to produce [a] deviation without dispersion and [b] dispersion without deviation.
18. Explain the construction and working of Michelson's interferometer and how is it used to determine the wavelength of the given source.
19. Derive an expression for the distance of n^{th} bright band from the edge of geometrical shadow formed due to Fresnel's diffraction at straight edge. Sketch the intensity distribution.
20. Define Specific Rotatory Power and explain [a] the construction of Laurent's half shade polarimeter and [b] how the specific Rotatory power is determined using the same.
21. With the neat diagram explain the principle, construction, working and applications of Nd:YAG laser
22. Obtain system matrix for a thin lenses and hence derive a relation for the focal length of a combination of two thin lenses separated by a distance. .
