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Department of Physics and Photonics Science
End Semester Examination (7th December, 2022)

Subject: Engineering Optics — Time: 3.0 Hours
Code: PH-314 — Total Marks: 50

All questions are compulsory.

Ques.1

(a) On what parameters does the deviation (δ) of an incident ray at a given height (h) on a thin lens depend? [1]

(b) For an achromatic converging combination of two thin lenses, the convex should be made of a material of smaller dispersive power. (T/F). [1]

(c) What is the reason of coma aberration? [1]

(d) What is the condition for minimum spherical aberration for two thin lenses of focal lengths f_1 and f_2? [1]

(e) How the fringe width (W) in Young's double slit experiment is calculated? [1]

(f) What is the effect of increasing the radius of curvature of plano-convex lens on the Newton's ring size? [1]

(g) What is the effect of reducing the slit width in case of Fraunhofer diffraction due to single slit? [1]

(h) Define the dispersive power of plane transmission diffraction grating. [1]

(i) The refractive index for water is 1.33. Calculate the polarising angle for water. [1]

(j) If a circularly polarized light is passed through λ/4 plate, what type of light will you get at the output? [1]

Ques. 2 Explain Astigmatism aberration with proper ray diagram. Write one method of removing astigmatism. [5]

Ques. 3 Explain the working of Michelson Interferometer (MI) with its schematic diagram. Write down the condition to obtain (i) circular and (ii) straight fringes. What is the condition of getting bright and darks central circular fringes in MI. [5]

Ques. 4 Explain the formation of fringes in Fabry-Perot interferometer (FPI) and discuss the effect of increasing reflectivity on the sharpness of fringes. Write advantages of FPI over MI. [5]

Ques. 5 Explain the difference between the Fresnel and Fraunhofer classes of diffraction with proper ray diagram. If a plane wave is incident on a slit, at what distance one will get a transition region from Fresnel to Fraunhofer diffraction. [5]

Ques. 6 A parallel beam of light is incident on a plane transmission grating having 4250 lines per cm. and a second order spectral line is observed at an angle of 30°. Calculate the wavelength of light. [5]

Ques. 7 Explain doubly-refracting crystals with their classification? What is the difference between ordinary and extra-ordinary rays? What do you mean by positive and negative crystals? [5]

Ques. 8 How will you distinguish between (i) circularly polarised light and unpolarised light, (ii) Elliptically-polarised and partially plane polarized?, and (iii) how will you convert left handed circularly polarized light to right handed circularly polarized light? [2+2+1]

Ques. 9 Define specific rotation? Describe the construction and working of Optical Polarimeter based on Laurent's half shade device. [5]

.....Good Luck.....