DEPARTMENT OF PHYSICS
Engineering Optics (PH 301)
Mid-semester Assignment

Full Marks: 25 **Date: Oct. 03, 2020**

Answer all questions.

1. A Fabry-Perot interferometer is required to resolve the longitudinal modes of a He-Ne laser emitting 632.8 nm radiation. The inter-mode separation of the He-Ne laser is 300 MHz. What minimum plate separation is required if the reflectivity of its plates R = 0.99? What is the free spectral range of the interferometer in frequency and wavelength units in this spectral range? What is the highest order of the fringes produced by the interferometer? [5]

2. A glass lens of refractive index 1.5630 is to be nonreflecting on both surfaces. What should be (a) the refractive index of a surface coating material and (b) its thickness for green light of wavelength 550 nm, to produce 0 percent reflectance? [5]

3. Define ABCD matrix and explain how it is used in determining the position and angle of output ray in a lens system. Also, derive the ray-transfer matrix for the situation when optical ray passes through a thin lens. [5]

4. Explain the working principle and uses of a Twyman-Green interferometer. Also, discuss how does it differ from Michelson interferometer and wavefront shearing interferometer? [5]

5. Write an essay on lens design. Explain the relevance of parameters related to lens design. How aberrations are taken care while designing a lens? Draw schematic diagrams wherever necessary. [5]
