

**DEPARTMENT OF PHYSICS**  
**Engineering Optics (PH 301)**  
**Mid-semester Evaluation: Part II**

Full Marks: 20

Date: Sept. 20, 2021

Time: 24 Hrs

Answer all questions.

1. Prism and grating both provide the visible colors of light when illuminated with white light. Explain through diagrams the basic principles involved in the processes. Can a prism be used only as phase shifting device? [4]
2. Define ABCD matrix and explain its utility in detail through schematic diagrams. Also, derive the expression for ABCD matrix for the situation when optical ray passes through a thin lens. [4]
3. Explain through diagrams the difference in working principles of Twyman-Green and Michelson interferometers. Also, discuss some of their applications. [4]
4. 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 is  $R = 0.99$ ? 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? [4]
5. Define modulation transfer function (MTF). Explain how resolution and contrast are associated with MTF. Draw the relevant plot. [4]

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