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

Full Marks: 35 **Date: Nov. 22, 2021** **Time: 24 Hrs**

Answer all questions.

1. What is the role of polarizers in a liquid crystal-based display device? Explain through schematic diagram how light emitting diode (LED) helps provide better features of images in a LED TV. How resolution changes in different versions of TVs? [5]

2. What is the difference between an optical microscope and electron microscope? Discuss the limitations of an optical microscope and explain how the limitation is overcome by electron microscope. Derive mathematical expressions and draw necessary figures, wherever required. [5]

3. Charge-coupled device (CCD) camera and thermal imager both provide images of objects under inspection. Explain through diagrams the basic principles of their functioning and applications. Can a CCD camera replace a thermal imager? [5]

4. Mention the storage capacities of CD, DVD, blue-ray disc, and dual-layer blue-ray disc. What is the reason behind different values? Discuss the principle used in writing and reading with a CD. Suggest how to enhance the storage capacity further. [5]

5. Consider a fully-phase object with amplitude transmittance, $t(x,y) = exp[i\phi(x,y)]$. How this fully-phase object can be observed? Explain with derivation and diagram the principle of positive and negative phase contrast. [5]

6. Photographs of the ground are taken from an aircraft flying at an altitude of 2,000 meters by a camera with a lens of focal length 50 cm. The size of the film in the camera is 18×18 cm^2. What area of the ground can be photographed by this camera at any one time? [5]

7. State the Grassman laws of linearity and additivity of color theory. Also, explain the color matching equation and unit equation of color theory. [5]
