Indian Institute of Technology Patna

Department of Physics

Mid-semester Examination

Optics & Lasers (PH 201)

Full Marks: 30 **Date: Feb. 25, 2019**

Answer all questions.

1. Explain how ***Poisson spot*** is formed. [2]
2. What are the benefits optical processing offers in comparison to digital processing? [1]
3. In Young's double-hole experiment, calculate I/I_{max}, where I represents the intensity at a point where the path difference is $\lambda/5$. [2]
4. Sketch the diffraction pattern of a Gaussian field. [2]
5. Prove the following formula for phase transformation due to a thin lens. [5]

$$t_l(x,y) = \exp\left[-j\frac{k}{2f}(x^2+y^2)\right]$$

6. Derive the expressions for reflectivity of the Fabry-Perot etalon. Explain why the etalon provides better resolution as compared to the two-beam interference method. [2+2+2]
7. Define holography and explain the difference between photography and holography. Also, mention some of the applications of holography. [4]
8. Consider a circular aperture of diameter 2 mm illuminated by a plane wave. The most intense point on the axis is at a distance of 200 cm from the aperture. Calculate the wavelength. [4]
9. Consider a straight edge being illuminated by a parallel beam of light of wavelength 600 nm. Calculate the positions of first two maxima and minima on a screen at a distance of 50 cm from the edge. [4]
