Department of Physics
Indian Institute of Technology Delhi
PHL558 Applied Optics
Major Exam (29 April 2008)

Answer all the questions

1. What are scalar waves? (3)
2. How do you achieve negative phase contrast in a Zernike's phase contrast microscope? (5)
3. Obtain an expression for the fringe spacing when two plane-waves (wavelength λ) interfere, such that the angle between their wave normals is 2θ. Assume symmetric incidence with respect to fringe plane. (5)
4. A spherical wave is incident on an optical element and gets converted into an on-axis plane wave. What is the transmittance function corresponding to that element? (5)
5. Explain double exposure holographic interferometry. (5)
6. What is twin imge problem in Gabor hologram? (5)
7. In a single slit diffraction pattern if you want to reduce the central maximum intensity by a factor of two, how much the slit width should be changed? (4)
8. Write down at least four differences between a hologram and a photograph. (4)
9. State whether the following statements are true or false (3)
   (a) In holographic interferometry the fringes are seen on the virtual image.
   (b) Hologram of a point source is a hololens.
   (c) Real image is used for display purposes.
10. Draw an experimental configuration for recording a holograting (having constant frequency), with point object and reference sources. (4)
11. How do you detect a circularly polarized light? (3)
12. What is intermodal dispersion in optical fibers? How can you reduce this? (4)