國立中央大學104學年度碩士班考試入學試題

所別：光電科學與工程學系碩士班 不分組(一般生)　科目：光學　共 / 頁 第 / 頁

本科考試可使用計算器，廠牌、功能不拘　＊請在答案卷（卡）內作答

參考用

1. A coin is placed at the bottom of a swimming pool with the water depth of 1m. What's the apparent depth of the coin by the viewer if he stands by the pool side? The water refractive index = 1.3. (10%)
2. A monochromatic point source is used with a Young's two-slit interferometer. The interfered fringes are observed on a screen with a distance from the slits. Answer the following questions, explain for full credit. (25% , 5% each)
   (a) The point light source is replaced by a point source with sorter wavelength. Does the spacing of the fringes increase or decrease?
   (b) The spacing between the two slits is decreased. Do the spacing of the fringes increase or decrease?
   (c) The width of the two slits is decreased as the same. Do the spacing of the fringes increase or decrease?
   (d) The distance between the slits and the observation screen is increased. Do the spacing of the fringes increase or decrease?
   (e) The surrounding medium between the slits and the screen is replaced by a high refractive index medium. Do the spacing of the fringes increase or decrease?
3. Explain the difference between a red laser pointer and a red LED flashlight when they are both shined into a distant wall? Assume they both have the same power, aperture size and spectrum distribution. (15%)
4. Define Numerical Aperture of a microscope objective and explain why immersion type microscope objective always have Numerical Aperture (N.A.) larger than 1. (10%)
5. You are given a crystal ball. The incoming light focus at the other side of the ball surface. What 's refractive index of the crystal ball? (10%)
6. Suppose that an ideal linear polarizer is rotated at the angular speed ω (rad/sec) between a similar pair of stationary linear polarizers. The emergent flux density will be modulated according to the rotational frequency. Plot the relationship of the output flux with the rotational angular speed ω. Assume the input flux is 1 watt. (15%)
7. Explain the following terms : (a) Fresnel Lens (b)Fresnel reflection (c) Fresnel diffraction (15%)