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

本科考試禁用計算器　　　　　　　　　　　　　　　　　　　＊請在試卷答案卷（卡）內作答

1. (a) 說明為何一個無像差的透鏡無法將一個點光源發出的光會聚成無窮小的聚焦點？ (4%)
   (b) 若上述的聚焦系統是以雷射為光源，指出最有效的二種方法（及調整其中二項參數）可使該聚焦系統的聚焦點能有效地縮小。(6%)

2. 有一種平板毛玻璃，其一邊為光滑面，另一邊為粗造面（霧面）。
   (a)說明為何在毛玻璃後的物體，當其距離毛玻璃距離越遠時，影像越模糊？(5%)
   (b) 將該毛玻璃浸於一種透明液體中，即呈現如一般平滑玻璃的穿透感（或可說該霧面效果消失），說明此液體可能具有的光學參數與其原理。(5%)

3. Explain how a Fresnel lens works? (10%) Sketch the structure of Fresnel lens and compare it with a normal lens. (5%)

4. A Plano-convex lens with curvature radius 200 cm of the convex side is made of glass which refractive index is 1.5.
   (a) What is the effective focal length (EFL)? (10%)
   (b) A object is placed ahead of the lens for 100 cm. Where is the image located? (5%)

5. Choose all of the following which are conjugate planes? (2% of each item)
   (a) Front principal plane and back principal plane.
   (b) Front focal plane and back focal plane.
   (c) Front nodal plane and back nodal 1 plane.
   (d) Entrance pupil and exit pupil.
   (e) Aperture stop and field stop.

6. When an un-polarized beam is incident from the air to the glass (n=1.55), find the Brewster angle and the polarization of the reflected beam. (10%)

7. A beam from a He-Ne laser (λ=633 nm) falls on two long narrow slits separated by 0.2 mm. If the fringes on an observing screen are 10 mm apart,
   (a) How far away is the screen? (10%)
   (b) How far from the central axis on the screen is the first zero of the irradiance? (10%)

8. Two orthogonal optical electric fields are in the following form:
   $$\vec{E}_x(z,t) = \hat{i}E_{0x}\cos(kz - \omega t) \text{ and } \vec{E}_y(z,t) = \hat{j}E_{0y}\cos(kz - \omega t + \varepsilon),$$
   (a) if $E_{0x}=E_{0y}$, and $\varepsilon = \pi/2$, plot the polarization. (5%)
   (b) if this light passes a polarizer whose transmission axis makes an angle θ to y-axis, find the final irradiance. (5%)

參考用