

**KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF PHYSICS**

**PHYS 201 – SECOND MAJOR EXAMINATION (TERM
071)
Instructor: Dr. Al-Solami**

Tuesday, 11 December 2007, 7 pm

Name: _____ **ID #** _____

Problem #	Grade / 10	Problem #	Grade / 10
1.		7.	
2.		8.	
3.		9.	
4.		10.	
5.		11.	
6.		12.	

Total : _____ / 120

Total: _____ / 20

1. Two thin covering lenses of focal lengths 10cm and 20 cm separated by 20cm. An object is placed 15 cm in front of the first lens. Find the position of the final image and the magnification of the system.

2. A candle is 50cm in front of a convex spherical mirror of radius of curvature 70cm.
- a) Draw a ray diagram and locate the image
 - b) Find the image distance
 - c) What is the magnification

3. A movie camera with a (single) lens of focal length 75cm takes a picture of a person standing 2.25m away. If the person is 170cm tall, what is the height of the image on the film?

4. A screen is separated from a double slit source by 1.2 m. The distance between the two slits is 0.3mm. The second order maxima ($m=2$) is measured to be 4.5 cm from the center line.
- a) Find the wave length of the light
 - b) Calculate the distance between adjacent bright fringes

5. Two light waves combine at a certain point where their electric field components are

$$E_1 = E_0 \sin \omega t,$$

$$E_2 = E_0 \sin (\omega t + 60^\circ).$$

a) Find the resultant electric field $E(t)$

b) Find the resultant intensity knowing the individual wave has an intensity I_0

6. Calculate the minimum thickness of a soap bubble film ($n=1.3$) that will result in a constructive interference in the reflected light if the film is illuminated with light whose wavelength is 600nm

7. Find the ratio of intensities of the first order maxima to the intensity of the central maxima for a single slit diffraction pattern.

(Hint: $a \sin\theta = (m + \frac{1}{2})\lambda$ maxima)

8. Two strong lines in the spectrum of sodium have wavelengths of 589.00 nm and 589.59 nm
 - a) What must be the resolving power of the grating in order to distinguish those wavelengths?
 - b) How many lines of the grating must be in order to resolve the lines in second order ($m=2$).

9. The two headlight of an approaching car are 1.5 m apart. Assume that the pupil of the eye is 5.0 mm, and the wavelength of the light is 550nm. Find
- The angular separation
 - The maximum distance will the eye separate them

10. Two spaceships A and B are moving in opposite direction. An observer on the earth measures the speed of A to be $0.75 C$ and the speed of B to be $0.85C$. Find the velocity of B with respect to A.

11. A spaceship in the form of a triangle flies with a speed of $0.95 c$ with respect to the earth in the x-direction. When the ship is at rest the distance X and Y are 50.0cm and 250.0 cm respectively. What is the area of the spaceship as seen by an observer at rest when the ship is in motion along the x-direction?

12. A certain wavelength in the light from a galaxy are observed to be 0.5% shorter than the corresponding light from earth source

- a) What is the radial speed of this galaxy with respect to Earth
- b) Is the galaxy approaching or reading from earth?