

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.  
(For candidates admitted during the academic year 2004-05 & thereafter)

SUBJECT CODE : **PH/MC/OS44**

**B.Sc. DEGREE EXAMINATION APRIL 2007**  
BRANCH III - PHYSICS  
FOURTH SEMESTER

COURSE : **MAJOR – CORE**  
PAPER : **OPTICS AND SPECTROSCOPY**  
TIME : **2 ½ HOURS** MAX. MARKS : 70

**SECTION - B**

ANSWER ANY FIVE QUESTIONS: (5 x 5 = 25)

1. Calculate the focal length of a biconvex lens with radius of curvature 0.3m for each surface, and refractive index 1.5.
2. For a normal eye, the distance between the eye lens and retina is about 2.5cm. Calculate the focal length of the eye lens while reading a book at a distance of 2.5cm from the eye.
3. Find the separation of two points on the moon that can be resolved by a 0.5m telescope for a light of wavelength 5500 Å. Distance of the moon is  $3.8 \times 10^5$  km.
4. Monochromatic light of wavelength 5100 Å from a narrow slit is incident on a double slit. If the fringe width is 0.2cm on a screen 2m away, calculate the slit separation.
5. Calculate the polarising angle for a glass of refractive index 1.732.
6. Sugar of 10% concentration in a tube of length 10cm, rotates the plane of polarisation of incident light by  $6^\circ$ . Calculate the specific rotatory power of sugar.
7. A sample shows Stoke's lines at 4458 Å, for an incident light of wavelength 4358 Å. Deduce the wavelength of anti stoke line.

**SECTION - C**

ANSWER ANY THREE QUESTIONS: (15 x 3 = 45)

8. Derive the equivalent focal length of two thin lenses separated by a finite distance.
9. Explain with theory, the method of determining the wavelength, of a monochromatic source using Michelson's interferometer.
10. Discuss plane diffraction grating at oblique incidence and obtain the expression for the width principal maximum.

11. Explain the method of production and detection of circularly and elliptically polarised light.
12. With a block diagram, explain the experimental method to study ESR.

