

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2008-09)

SUBJECT CODE : PH/MC/OS54

B.Sc. DEGREE EXAMINATION NOVEMBER 2010
BRANCH III - PHYSICS
FIFTH SEMESTER

REG. No. _____

COURSE : MAJOR – CORE
PAPER : OPTICS AND SPECTROSCOPY
TIME : 30 MINS.

MAX. MARKS : 30

SECTION – A

TO BE ANSWERED IN THE QUESTION PAPER ITSELF

ANSWER ALL QUESTIONS:

(30 x 1 = 30)

I. CHOOSE THE CORRECT ANSWER:

- $\mu = \frac{\sin i}{\sin r}$ is
a) Snell's law of reflection b) Snell's law of refraction c) Total Internal reflection
- A Thick lens has
a) 2 Spherical surface b) 1 spherical surface c) 3 Spherical surface
- The focal length of a lens is 20cm. Its power is equal to
a) .05 b) .5 c) 5 d) .005 dioptrre
- The centre of Newton's rings when viewed through a microscope should be
a) Bright b) dark c) both
- A fringe is a path of constant _____ difference
a) amplitude b) phase c) wavelength
- If the phase difference between two waves is π the path difference is
a) $\lambda/2$ b) $\lambda/4$ c) $\lambda/8$
- The reciprocal of focal length is
a) Power b) Cardinal point c) Magnification
- The frequency and wavelength of light-wave are related through the equation
a) $v = \frac{c}{\lambda}$ b) $v = c\lambda$ c) $v = \lambda$
- The focal length of telephoto lens is
a) $f = \frac{f_1 f_2}{f_1 + f_2 - d}$ b) $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$ c) $f = \frac{f_1}{f_1 + f_2}$
- The angular dispersion in a prism is
a) $\delta = (\mu - 1)A$ b) $(\mu - 1)$ c) $(\mu - 1)\frac{A}{2}$
- Aberration that occur due to dispersion of light is
a) Chromatic aberration b) aberration c) spherical aberration
- The lenses used in cameras are called
a) Achromatic doublets b) Spherical c) Concave
- The power of Ramsden eyepiece is
a) Positive b) Negative c) Zero
- The condition for Bandwidth in Young's double slit is
a) $B = \frac{\lambda D}{d}$ b) $B = \lambda D$ c) $B = D$
- Scattering of light with-change in frequency is called
a) Compton effect b) Einstein photoelectric effect c) Raman effect

II. FILL IN THE BLANKS:

16. 1 Angstrom unit = _____.
17. Light travels along a path having _____ (min) path length.
18. Dispersive power $\omega = \frac{\quad}{\mu-1}$.
19. $(a + b) \sin \theta = m\lambda$ is the diffraction condition for _____.
20. The specific rotatory power is given by $S = \frac{\quad}{\quad}$.
21. The radius of 1st half period zones are _____.
22. _____ plano concave lens are used in Ramsden's eye piece.
23. The difference in wavelength of 2 waves in Michelson Interferometer is _____.
24. Light travels in _____ lines.
25. $a \sin \theta = n\lambda$ is the condition for _____ diffraction due to single slit.

III. ANSWER BRIEFLY:

26. State Fermat's principle.
27. What is Fresnel's biprism.
28. What is Resolving power?
29. State Raman effect.
30. Define optical activity.

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TIME : 2½ HOURS **MAX. MARKS : 70**

SECTION – B

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

1. Find the focal length of thick lenses.
2. Explain Interference in thin films.
3. The focal length of achromatic combination of 2 lenses in contact is 150 cm. If the dispersive powers of the materials of the two lenses are .018 and .027, calculate the focal length of two lenses.
4. In a Newton's ring experiment, the diameter of 10th dark ring due to wavelength 6000Å in air is 0.5 cm. Find the radius of curvature of the lens.
5. A parallel beam of light of wavelength 5460Å is incident at an angle of 30° on a plane transmission grating which has 6000 lines/cm. Find the highest order spectrum that can be observed.
6. A 200 mm long tube containing of 48 cm³ of sugar solution produces a optical rotation of 11° when placed in a Saccharimeter. If the specific rotation of sugar solution is 60°. Calculate the quantity of sugar contained in the tube in the form of solution.
7. From the Beer Lambert law calculate the concentration of the given chlorophyll solution, given optical activity = .8 , $\epsilon = 20,000$, length of the uv cell = 1cm.

SECTION – C

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

8. Explain construction and working of Huygen's eyepiece.
9. Determine-wavelength of monochromatic source of light by Michelson interferometer.
10. Explain plane diffraction grating with theory and experiment.
11. Determine optical activity and specific rotation of sugar solution.
12. Give the theory of Raman effect. Explain experimental arrangement to determine stokes and antistokes lines.

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