

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

REG. No. \_\_\_\_\_

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

TO BE ANSWERED IN THE QUESTION PAPER ITSELF

**SECTION - A**

ANSWER ALL QUESTIONS: (30 x 1 = 30)

I CHOOSE THE CORRECT ANSWER:

- Spherical aberration can be reduced by  
a) reducing the size of aperture      b) reducing the intensity of light  
c) using monochromatic light      d) using a bigger lens
- A path difference of  $0.25 \lambda$  corresponds to a phase difference of  
a)  $45^\circ$       b)  $90^\circ$       c)  $180^\circ$       d)  $25^\circ$
- An air wedge produces fringes of width 0.1mm for a wire of thickness 0.1mm.  
For a wire of thickness 0.2mm, the fringe width will be  
a) 0.2mm      b) 0.4mm      c) .05mm      d) .01mm
- If the first of the Newton's rings has radius 1mm, the ninth ring will have radius  
a) 9mm      b) 1.414mm      c) 1.707mm      d) 3mm
- If  $r_n$  is the radius of  $n^{\text{th}}$  ring on a zone plate, then the focal length of the zone plate is  
a)  $f_n \propto r_n^2$       b)  $f_n \propto r_n$       c)  $f_n \propto n^2$       d)  $f_n \propto \sqrt{n}$
- Rayleigh's criterion is for  
a) achromatism of lenses  
b) resolution of images  
c) resolution of images  
d) obtaining well defined interference fringes
- Astigmatism is caused by  
a) small size of the object      b) small size of the aperture  
c) light rays off the lens axis      d) light rays along the lens axis

8. Laurent's half shade plate can be used
- a) as a converging lens
  - b) as a diffraction grating
  - c) to study resolving power of polarisers
  - d) to analyse optical activity of a solution
9. Fraunhofer lines are
- a) spectral lines of absorption
  - b) spectral lines of emission
  - c) the lines on a diffraction grating
  - d) fringes obtained due to Fraunhofer diffraction
10. IR radiation lies between
- a) Red and UV
  - b) Red and microwave
  - c) UV and Violet
  - d) Microwave and radio waves
11. Jamin's refractometer uses the principle of
- a) deviation in a prism
  - b) Fraunhofer diffraction
  - c) interference due to path difference
  - d) dispersion without deviation
12. NMR deals with
- a) magnetic moment of the electron
  - b) magnetic moment of the atom
  - c) nuclear electric quadruple moment
  - d) magnetic moment of the nucleus
13. For observing ESR,
- a) unpaired electrons are essential
  - b) paired electrons are necessary
  - c) paired nucleus are essential
  - d) unpaired nucleus are necessary
14. Electronic spectra of molecules are found in
- a) microwave region
  - b) visible and UV region
  - c) IR and far IR region
  - d) IR and microwave region
15. The wavelength of a UV photon is about
- a) 6500Au
  - b) 1cm
  - c) 3000Au
  - d) 8000 Au

II STATE TRUE OR FALSE:

16. A beam of light passing through a medium has the property of reversibility of path.
17. A lens of large focal length has large convergence.
18. When a point object is placed on the lens axis, the image is totally free of coma.
19. Fresnel diffraction corresponds to plane wave front.
20. The refractive index of a crystal for extra ordinary ray is not a constant.

## III FILL IN THE BLANKS:

21. According to \_\_\_\_\_ principle, the path of ray of light is the path of minimum or maximum time.
22. For a glass, if the angle of incidence is  $45^\circ$ , the angle of refraction is  $30^\circ$ . The refractive index of the glass is \_\_\_\_\_.
23. The cardinal points of a lens are \_\_\_\_\_.
24. \_\_\_\_\_ prism can be used as a polariser.
25. Uniaxial crystals are \_\_\_\_\_.

## IV ANSWER BRIEFLY:

26. Indicate with a diagram how the Fresnel's biprism can be used to obtain interference.
  
  
  
  
  
  
  
  
  
  
27. Define plane of polarisation and plane of vibration.
  
  
  
  
  
  
  
  
  
  
28. State Malu's law.
  
  
  
  
  
  
  
  
  
  
29. What is optical activity?
  
  
  
  
  
  
  
  
  
  
30. State Raman effect.



