

May 2002

Bachelor of Computer Application (BCA) Examination

II Semester

**Physics –II**

Time 3 Hours

[Max. Marks 50]

**Note :** Attempt all five questions. Each question carries equal marks and has internal choice. Objective type questions are compulsory.

1 Show that TEM wave can not exist in a hollow conducting pipe (wave guide).

**OR**

(a) Discuss momentum and pressure of an Electromagnetic radiation and write about Nichols and Hull's experiment to verify radiation pressure.

(b) A beam of light with an intensity  $I=12 \text{ W/cm}^2$  falls perpendicular to a perfectly reflecting plane mirror of  $1.5 \text{ cm}^2$  area. What force act on the mirror ?

- (i) The pointing vector is given by .....( fill in the blank)
- (ii) Higher refractive index of the medium means lesser the velocity of EM waves in that medium. (true / false / not always)

2 (a) Discuss interference in a wedge shaped film.  
 (b) Two coherent sources of intensity ratio  $\alpha$  interfere, prove that in the interference pattern,

$$\frac{I_{\max} - I_{\min}}{I_{\max} + I_{\min}} = \frac{2\sqrt{a}}{1+a}$$

**OR**

- (a) What are the condition for sustained interference of light?
- (b) What is meant by "division of amplitude" and "division of wavefront" in interference. Give example.
- (c) A light of wavelength  $5100 \text{ \AA}$  from a narrow slit is incident on a double slit. If the overall separation of 10 fringes on a screen  $200 \text{ cm}$ . away is  $2.0 \text{ cm}$ ., find the double slit separation.
- (i) The waverfront origination from a rectangular slit is (spherical/ cylindrical/ planer/ none)
- (ii) One of the phenomenon which can not be explained by wave theory is ( Polarization/ Photo electric effect /Diffraction / Polarization)

3 Describe theory, construction, phase reversal and application of a zone plate in detail. Compare it with a convex lens.

**OR**

- (a) What is radius of the tenth zone in zone-plate of focal length  $20\text{cm}$  for light of wavelength  $5000 \text{ \AA}$ ?
- (b) How will you determine the wavelength of light by a straight edge?
- (c) Define dispersive power of a grating.
- (i) In Fraunhofer diffraction, the incident wave front is (spherical/ cylindrical/planer/ may be all/none).
- (ii) The diffraction pattern due to a single slit the width of the central maximum is more with yellow then ..... (red/ orange/both/none/)

4 (a) What is Optical activity ? Describe Fresnel's theory of optical rotation.  
 (b) What do you mean by Specific rotation? How will you find molecular rotation with the help of specific rotation?

**OR**

- (a) Describe Biquartz Polarimeter in detail.
- (b) Describe construction and working of a Nicol' s prism.
- (i) With the help of Half wave plate one generates a circularly polarized light. (true/ false)
- (ii) Dextro-rotatory substance rotates the plane of polarization in the clockwise direction (True/ false/ nothing can be said)

5. Describe one gas laser in detail.

**OR**

Define:

- (a) Spatial and Temporal Coherence
- (b) Spontaneous and Stimulated Emission
- (c) Population Inversion
- (d) Resonator Cavity
- (i) Lasing action is triggered by spontaneous emission in a laser system (true/ false).
- (ii) Laser light .....the ordinary light in free space. (faster than/ slower than/ having the same velocity velocity as.

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