June - July 2008

Bachelor of Computer Application (BCA) Examination

II Semester

# Physics - II

Time : 3 Hours ] [ Max. Marks : 40

**Note :** *Attemp all five questions. Solve any two parts from each question. All questions carry equal marks.*

1. (a) What are different types of transmission lines? Calculate the reflection co-efficient and voltage standing wave ratio.
   (a) What is ionosphere? How does the ionosphere affect the electromagnetic wave propagation?
   (c) What is Poynting Vector? Show that the direction of energy flow is normal to the plane of E and B.
2. (a) Explain the use of compensating plate in Michelson's interferometers. What phenomenon is responsible for the formation of frings in this interferometers?
   (b) Light of wavelength 5890 Å falls on a thin film on a thin glass ($\mu = 1.5$) plate, such that the angle of refraction in plate is 60° Find the minimum thickness of the plate such that the plate appears dark in the reflected light.
   (c) Obtain the condition for maxima and minima when two waves of same amplitude and frequencies are superimposed.
3. (a) What is a zone plate? How is it constructed? Explain how a zone plate behaves like a convex lens of multiple foci. Deduce the expression for its focal length.
   (b) Deduce the expression for the resolving power of a plane transmission grating kept normal to the light rays. Explain how resolving power of grating be increased.
   (c) Fraunhofer diffrection pattern due to a narrow slit of width of 0.03 mm is obtained on a screen by a convex lens of focal length 40 cm. The wavelength of light used is 5896 Å . Calculate the angle of diffraction for the first order dark band and also find its linear distance from the central maxima.
4. (a) What is Optical Activity? Discuss Fresnel's theory of optical rotation.
   (b) What are quarter and half wave plates? How are they constructed? Explain their use in the study of different kinds of polarised light.
   (c) A plane polarised light is made incident normally on a uni-axial double refracting crystal cut with the surface parallel to the optic axis. If the vibration of the incident light make an angle 30° with the crystal surface, calculate the ratio of intensities of ordinary and extra-ordinary vibrations. Given : $\lambda = 6000$ Å $\mu_e = 1.5532$ and $\mu_0 = 1.5442$.
5. (a) Explain the principle and working of a He-Ne Laser. What are the industrial and medical applications of a laser?
   (b) What is Doppler effect of light? Explain its applications in brief.
   (c) Explain the role of population inversion in the working of a laser. How is it achieved?

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