

June 2016

Bachelor of Computer Application (BCA) Examination

II Semester

**PHYSICS - II**

Time 3 Hours]

[Max. Marks 40

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

1. (a) What is a transmission line ? Obtain expressions for the reflection coefficient and voltage standing wave ratio.
- (b) Show that the electric and magnetic field equation in free space is given by :

$$\nabla^2 \vec{E} = \mu_0 \epsilon_0 \frac{\partial^2 \vec{E}}{\partial t^2} \quad \text{and} \quad \nabla^2 \vec{B} = \mu_0 \epsilon_0 \frac{\partial^2 \vec{B}}{\partial t^2}$$

- (c) Prove that the velocity of a plane electromagnetic wave is given by :

$$v = \frac{1}{\sqrt{\mu_0 \epsilon_0}}$$

2. (a) Describe and explain the formation of Newton's ring in reflected monochromatic light. Prove that in reflected light diameters of the dark rings are proportional to the square root of natural numbers.
- (b) What do you mean by interference ? Discuss interference in a wedge shaped film.
- (c) Calculate the distance between the two successive positions of a movable mirror of a Michelson interferometer giving best fringes in the case of sodium having lines of wavelength 5894 Å and 5896 Å.
3. (a) How will you determine the wavelength of light by a straight edge?
- (b) Describe theory construction, phase reversal and application of a zone plate in detail.
- (c) Define the term 'dispersive power of a grating' ? Derive an expression for it.
4. (a) What is polarised light ? How will you produce and detect plane, elliptically and circularly polarised light ?

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- (b) What is optical activity ? Discuss Fresnel's theory of optical rotation.
  - (c) Give the details of construction and theory of quarter and half wave plate.
5. (a) Explain the role of population inversion in the working of a LASER. How it is achieved ?
- (b) What are the characteristic properties of a laser beam ? Describe its important applications.
- (c) Find the velocity of sound, when the frequency appears to be (i) double, (ii) half, the original frequency to a stationary listener.

