

July 2009

Bachelor of Computer Application (BCA) Examination
II Semester**Physics - II**

Time : 3 Hours]

[Max. Marks : 40

Note- Attempt all five questions. Solve any two from each question. All questions carry equal marks.

1. (a) Write down the Maxwell's equations. Use them to establish the wave equation to electromagnetic wave and prove that the speed

of electromagnetic in vacuum is $C = \frac{1}{\sqrt{\mu_0 \epsilon_0}}$

- (b) The electron density of a layer of ionosphere at a height 150 km from earth surface is 9×10^{10} per m^3 . From this layer of ionosphere, for the transmission of electromagnetic wave by reflection up to range of 250 km, find (i) critical frequency of the layer, (ii) the maximum usable frequency.

2. (a) Discuss the interference of light in a thin parallel film and derive the expression for path difference in reflected region.

- (b) Explain : (i) Why Newton's rings are circular? (ii) Role of compensating plate in Michelson's interferometer.

- (c) In the Newton's ring experiment, the diameters of n th and $(n + 8)$ th bright rings are 4.2 mm and 7.0 mm respectively. The radius of curvature of the curved surface of convex lens is 2 m. Calculate the wave length of light used.

3. (a) Obtain expression for intensity distribution due to diffraction a single slit and discuss it graphically.

- (b) Explain the construction of Plane Transmission Grating. Write down the condition of principal maxima due to diffraction at grating and explain what happens when white light normally incidents on it.

- (c) What will be the minimum width of a grating which can resolve the two lines in the spectrum of sodium ($D_1 = 5896 \overset{\circ}{\text{Å}}$ and $D_2 = 5890 \overset{\circ}{\text{Å}}$) in the second order? The grating has 1000 lines per cm.
4. (a) Explain the phenomenon of double refraction in uni-axial crystal on the basis of the Huygen's Principle.
- (b) What are phase retardation plates? Explain their principle.
- (c) The refractive indices of Quartz for right handed and left handed circularly polarised light of wave length $7620 \overset{\circ}{\text{Å}}$ are 1.53914 and 1.53920 respectively. Calculate the angle of rotation produced by its plate of thickness 0.5 mm.
5. (a) What is Doppler effect of light? Explain its application.
- (b) Write short notes on the following-
- (i) Spatial Coherence and Temporal Coherence.
- (ii) Spontaneous and Stimulated Emission.
- (c) Explain construction and working Ruby Laser.

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