

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 mark.

1. (a) Describe electromagnetic wave guide in detail. What do you mean by the cutoff frequency.
(b) Write down Maxwell's equations and explain the concept of displacement current.
(c) Explain briefly :
 - (i) Transmission Lines
 - (ii) Impedance Matching
2. (a) Prove that the diameter of a Newton's bright ring is directly proportional to the square root of odd numbers.
(b) Discuss the formation of colours in thin film and show that with monochromatic light, the interference patterns of reflected and transmitted light are complimentary.
(c) White light is made incident normally on a soap solution ($\mu = 1.33$) film of thickness 5000\AA . Which wavelength in the visible region will get strongly reflected?
3. (a) What type of incident wavefront is required in the Fresnel's class diffraction. Distinguish between Fresnel and Fraunhofer class of diffraction.
(b) The first and second images of maximum intensities from a zone plate are obtained at distance 30 cm and 60 cm respectively. Calculate the distance of source from the zone plate.
(c) What is plane diffraction grating? Describe how would you employ it for determining the wavelength of light ?
4. (a) What is meant by double refraction? Explain double refraction by electromagnetic wave theory.

(b) How will you distinguish between :

- (i) Circularly polarized and unpolarised light
 - (ii) Elliptically polarised and partially polarized light.
- (c) Calculate the thickness of (i) a quarter wave plate and (ii) half wave plate, given that $\mu_e = 1.533$, $\mu_o = 1.544$ and $\lambda = 5000\text{\AA}$.
5. (a) Explain the following terms in brief :
- (i) Pumping
 - (ii) Metastable energy state
 - (iii) Population inversion
 - (iv) Doppler effect.
- (b) What do you mean by lasers? Discuss spontaneous and stimulated emission
- (c) Explain in brief, what is coherence? Calculate the coherence length and coherence time for 20 waves of light of wavelength 6600\AA .

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