

$$\frac{\gamma - \gamma'}{\gamma \cdot \gamma'} = \frac{h}{m_0 c^2} (1 - \cos \phi)$$

Student Roll No.

JK LAKSHMIPAT UNIVERSITY

Institute of Engineering and Technology

B. Tech First Semester (Batch 2012-16)

(Common to all Branches)

Special End-term Examination

Course Name: Engineering Physics-I

Course Code : PH101

Duration: 3 hours

Max marks: 40

Instructions: 1. Mobile phones are strictly prohibited in the examination hall.

2. Calculators are allowed.

- Q 1. Explain the formation of Newton's rings in reflected light. Prove that the diameters of the bright fringes are proportional to the square root of odd natural numbers. Explain the formation of dark spot at the centre of Newton's rings. [5]
- Q 2. A diffraction grating has 5000 lines per cm and the total ruled width is 5 cm. Calculate for a wavelength of 5000 Å in second order (i) the dispersion, (ii) the resolving power and (iii) the smallest difference in wavelength resolved. What happens if half the ruling width is covered? [3]
- Q 3. Starting with the expression of intensity distribution for Fraunhofer diffraction in a plane diffraction grating find the intensity and conditions for principal maxima and minima. [5]
- Q 4. The refractive indices of some transparent material for right handed and left handed circularly polarized light of sodium (wavelength 5893 Å) are 1.54427 and 1.54420 respectively. Calculate the specific rotation of that material. [3]
- Q 5. Define specific rotation. How will you determine it using Biquartz polarimeter? Discuss the relative merits of biquartz and half shade devices. [4]
- Q 6. In a Compton scattering experiment, a beam of X-rays of wavelength 0.708 Å in incident on a target and X-rays of wavelength 0.732 Å scattered by a target through a right angle are detected. Determine the Planck constant. Given $m_0 = 9.1 \times 10^{-31}$ kg and $c = 3 \times 10^8$ m/s [3]
- Q 7. If the wavelength of x-ray photon is 1 Å, what will be its momentum? [3]
- Q 8. The x-coordinate of a proton is known to be somewhere between 0.0123 mm and 0.1127 mm. what is the order of uncertainty in the x-components of its velocity? [3]
- Q 9. A Proton is confined in one dimensional box of width 10^{-10} m. What is the minimum energy (zero point energy) of proton. [3]
- Q 10. Discuss the complete theory of Compton effect. Show that the change in the wavelength during Compton scattering depends only on the scattering angle. [4]
- Q 11. Find the energy eigen values and eigen functions for a particle enclosed in one dimensional box. [4]