Prof. Dr. P.B. Barman

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
FINAL EXAMINATION
SUMMER SEMESTER - JUNE 2016
B.Tech. I Semester

COURSE CODE: 10B11PH111   MAX. MARKS: 50
COURSE NAME: PHYSICS-I
COURSE CREDITS: 04   MAX. TIME: 2 Hrs

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Q1.

  a) Distinguish between the dispersive and resolving power of a grating. Deduce an expression for the dispersive and resolving power of a plane transmission grating.   [7]

  b) What will be the minimum number of lines on a grating which will just resolve Sodium doublet having wavelengths **589 nm** and **589.6 nm** in first and second order?   [3]

Q2.

  a) How can circularly and elliptically polarized lights be produced? Explain with the help of a neat diagram, how will you determine whether a beam of light is unpolarized, plane polarized, circularly polarized or elliptically polarized?   [7]

  b) When light is incident at an angle of 60^0 to the normal, the reflected beam is plane polarized. What is the refractive index of the medium? Also calculate the angle of refraction.   [3]

Q3.

  a) Two Nicol prisms are so arranged that the amount of light transmitted through them is maximum. What will be the percentage reduction in the intensity of incident light when the analyzer is rotated through 30^0, 45^0, 60^0 and 90^0?   [5]

  b) A mass of 80 gms of sugar dissolved in one litre of water contained in a tube of length 20 cm causes an optical rotation of 12^0 with wavelength 400 nm at a temperature of 27^0C. What mass of sugar should be dissolved in 2 litres of water so that the solution placed in a tube of length 30 cm would cause an optical rotation of 24^0?   [5]

Q4. What was the aim of Michelson-Morley experiment? Describe the Michelson-Morley experiment and obtain the expected fringe shift. Explain how negative results obtained are interpreted.   [10]

Q5.

  a) Derive an expression for relativistic variation of mass with velocity. Hence prove that it is not possible for a material particle to have velocity equal to or greater than velocity of light.   [7]

  b) Calculate the percentage contraction in the length of a rod (**length = 1.5 m**) moving with a velocity **0.98c** in a direction inclined at 45^0 to its own length.   [3]