

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- Dec 2017

B.Tech I Semester (CSE, CE, ECE, IT)

COURSE CODE: 10B11PH111

MAX. MARKS: 35

COURSE NAME: PHYSICS-I

COURSE CREDITS: 04

MAX. TIME: Two Hours

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

- Q1. (a) Explain the effect of introducing a thin plate of glass in the path of one of interfering beams in Young's double slit experiment. Calculate the displacement of fringes. [3]
 (b) Consider a non reflecting film of refractive index 1.38. Assume that its thickness is 9×10^{-6} cm. Calculate the wavelength in the visible region for which the film be non reflecting. [2]
- Q2. (a) Describe in detail how would you use plane transmission grating to determine the wavelength of light. [3]
 (b) By using Brewster's law show that the light incident on a transparent substance at polarizing angle gives reflected and refracted rays at right angle to each other. [2]
- Q3. (a) Establish mathematically Einstein's mass energy relationship. Explain the physical significance of the relation. [3]
 (b) Two photons approach each other, what is their relative velocity? [2]
- Q4. (a) How you can find e/m of an electron from Zeeman effect? In normal Zeeman effect experiment a spectral line having wavelength 422.6 nm splits into three lines separated by 0.025 nm in magnetic field of 3 T. Determine e/m of the electron from this data. [3]
 (b) Is state $^2s_{3/2}$ possible or not? Explain. [2]
- Q5. (a) Explain the term efficiency of a heat engine and deduce an expression for the efficiency of Carnot's reversible heat engine. [3]
 (b) A motor car tyre has a pressure of 2 atmospheres at room temperature of 300 K. If the tyre bursts suddenly, find the resulting temperature. [2]
- Q6. (a) A Carnot's engine is operated between two reservoirs at temperatures of 450 K and 350 K. If the engine receives 4200 Joules of heat from the source in each cycle, calculate the amount of heat rejected to the sink in each cycle. Calculate the efficiency of the engine and work done by the engine in each cycle. [3]
 (b) Write down the four Maxwell's thermodynamic relations. [2]
- Q7. (a) Discuss with suitable diagram the principle of construction and working of a Ruby laser. [3]
 (b) Explain the concept of wave particle dualism. Write the expression for de-Broglie wavelength of matter wave. [2]