

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-3 (Dec-2019)

B.Tech I Semester (BI/BT)

COURSE CODE: 18B11PH112

MAXIMUM MARKS: 35

COURSE NAME: Basic Engineering Physics-1

COURSE CREDITS: 4

TIME ALLOWED: 2HRs

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Attempt all the questions in sequence.*

1. Can Newton's rings be formed by using two plano convex lenses? If yes, explain how, if No then why? Newton's rings are observed by placing water between the plate and lens. The diameter of the 8th ring is 3.8 mm. If the system is illuminated by Na light of 589.3 nm the radius of the curvature of the plano-convex lens is 1 m, calculate the refractive index of water. [3+2]
2. A diffraction grating used at normal incidence gives a yellow line (600 nm) in a certain spectral order superimposed on a blue line (480 nm) of next higher order. If the angle of diffraction is  $\sin^{-1}(\frac{3}{4})$ , calculate the grating element, also explain Brewster's law and show that at polarizing angle the reflected and transmitted ray are at right angles. [2.5+2.5]
3. Explain the working of He-Ne laser in detail. What is top down and bottom up approach of nanoparticle synthesis. [3+2]
4. What is mass defect and how is it related to binding energy? Obtain the binding energy for  ${}_{26}\text{Fe}^{56}$ , Also calculate binding energy/nucleon. [  $m_p = 1.007825$  a.m.u and  $m_n = 1.008665$  a.m.u] [2+3]
5. Derive Poiseuille's law for a liquid flowing in a narrow tube. An air bubble of radius 5mm rises through a tube at a steady speed of 2 mm/sec. If the liquid in the tube has a density of  $1.4 \times 10^3$  kg per cubic meter. What is its Viscosity [3+2]
6. Describe the flow of blood in a human body. A Pitot tube is being used for measuring the velocity of blood flow. Calculate the blood velocity if the manometer records a pressure of 0.25 mm of Hg. Density of blood is 1020 kg per cubic meter. [3+2]
7. With suitable diagram explain what is the importance of contact angle in surface tension? A capillary tube when immersed vertically in a liquid records a rise of 3 cm. If the tube is immersed in the liquid at an angle of  $60^\circ$  with the vertical, calculate the length of the liquid column along the tube. [3+2]