Roll No.

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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

Test-1 Examination-September 2016

B.Tech. 1st Semester (BT/BI)

Course Code: 16B1PH112 Max. Marks: 15

Course Name: Basic Engineering and Applied Physics

Course Credit: 4 Max. Time: 1 Hr

Note: All questions are compulsory; carrying of mobile phones will be treated as the case of unfair means.

Q.1. Draw and explain the Jablonski diagram? 2

Q.2. Discuss the Stokes shift and mirror image rule? 1

Q.3. Differentiate between characteristic and Brehmsstrahlung radiations of X-rays? Derive the Bragg's law? 2

Q.4. What is the significance of wave function and normalization condition? 1

Q.5. What are the boundary conditions for particle in a box problem. Prove that $\psi(x)=A\sin kx+A\cos Bx$ is the solution of $\frac{\partial\psi(x)^2}{\partial x^2}+k^2x=0$. 2

Q.6. Using Bragg's law determine the distance in Å between crystal planes in an atomic solid if electromagnetic radiation of frequency 3.32×10^{17} s^{-1} incident at a 40^o angle creates constructive interference fringes assume n=1. 1

Q.7. For which set of crystallographic planes will a first order diffraction peak occur at diffraction angle of 44.53^o for FCC crystal when monochromatic radiation having a wavelength of 0.1542 nm is used. Given atomic radius is 0.1246 nm, where $a=\frac{4}{\sqrt{2}}r$.

1

Q.8. An electron has a speed of 2×10^4 cm/sec accurate to 0.01%. With what fundamental accuracy can we locate the position of this electron? Given $m=9\times10^{-28}$ m and $h=6.62\times10^{-27}$ erg.sec. 1

Q.9. Prove that the free electron cannot reside in the nucleus. 2

Q.10.The electron in the hydrogen atom may be thought of as confined to a nucleus of radius 7×10^{-11} meter. Calculate the minimum uncertainty in the momentum of the electron. Also calculate the minimum kinetic energy of the electron. Given $m=9\times10^{-28}$ m and $h=6.62\times10^{-27}$ erg.sec. 2