**Wave Particle duality (De-Broglie’s eqn):** It was found that electromagnetic wave Asuch as X-ray, ray shows the property of particle similar to electron, photon and equivalent wavelength of this particle is defined by De-Broglie’s eqn. i.e. where = equivalent wavelength, p = momentum of particle, h = Plank’s Universal Constant = 6.62 x 10-34 Js where and . Wave number is defined as number of complete wave cycle of electromagnetic field that exists in one-meter linear space. *Exp. 1:* It was observed that beam of particle such as electron get defracted similar to X-ray, ray which are electromagnetic wave and the energy possessing by particle is given by, <br>*Exp.2* It was observed that electromagnetic radiation is required to eject electron from surface of material. If is work function of that material then minimum frequency required to eject electron is given by It was found that electromagnetic wave behaves like particle with packets of energy when it collides with microscopic particle like electron. Similarly, particles like electron behaves as a wave. Hence, we can conclude that there is no separate wave and particle and combined they are termed as particle-wave or wave-particle (wavicle). **Wave Function:** Schrodinger’s eqn is a combined form of wave-particle duality. The displacement of wave about its mean-position is represented by wave function as below <br> We have, or, and <br> From eqn 1, 2 & 3 <br> Diff. w.r.t. t <br> Diff. (4) w.r.t x Again, or, At lower speed energy is sum of potential and kinetic energy or, or, <br> which is *time dependent form of Schrodinger’s eqn in 1D. For time dependent Schrodinger’s eqn in 3D:* Laplace operator is introduced which is given by <br> Then, which is time dependent form of Schrodinger’s eqn in 3D. *For time independent Schrodinger’s eqn* we have from eqn (7) or, <br> for 1D <br> for 3D. <br> Eqn 8 & 9 represent time independent Schrodinger’s eqn in 1D and 3D repectively. **Derive Schrodinger’s eqn in 1D from classical mechanics**: Diff. w.r.t. x <br> Again We know, or, or, or, From eqn 1 & 2 or, in 1D <br> in 3D. **Free electron theory in metal**: In a metal there are two types of particles present namely electrons and ions. According to this theory, the outer most electron is known as valence electron and are loosely bounded by the parent atom. These electrons can move freely throughout the metals and these electrons within the metal are also known as electron gases. In free electron theory, it is assumed that potential due to the ion core is uniform so that free electron has same potential energy everywhere in a metal and can move freely. <br> We have, also,