KATWA COLLEGE

B.Sc 5th Sem Internal Assessment Examination — **2021**

Subject: Physics

Paper: CC-XI(H)

Date:10.01.2022

Time :1h   *FM-10*

Answer Scripts PDF Send to this email ID: examrelated2021@gmail.com

Answer any five questions:

a) Show that if $\hat{A}$ and $\hat{B}$ are Hermitian, then i$[\hat{A},\hat{B}]$ is Hermitian.

b) Prove that the z-component of the orbital angular momentum operator $\hat{L}z$=-i$\hbar\frac{\partial}{\partial\varphi}$, where φ is the azimuthal angle, is Hermitian.

c) Show that the effective potential energy of an electron in the hydrogen atom, consisting of the Coulomb and centrifugal parts, is a minimum at r=l$(l+1)a_0$, $w$here a_0 is the Bohr radius.

d) Show that the orbital angular momentum of the electron in hydrogen atom is L=$\sqrt{l(l+1)}\hbar$, where l is the orbital quantum number.

e) Using Uncertainty principle estimate the ground state energy of the L.H.O.

f) Find the magnetic moment of the state $^2D_{3/2}$.

g) Compute the Zeeman pattern for $^2D_{3/2}$-$^2P_{1/2}$.