

Roll No. 

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Total No. of Pages : 02

Total No. of Questions : 07

**B.Sc.(CS) (2013 & Onwards) (Sem.-4)****QUANTUM MECHANICS**

Subject Code : BCS-404

M.Code : 72320

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and a student has to attempt any FOUR questions.

**SECTION-A****1. Answer briefly :**

- (a) Why cannot we observe de-Broglie wavelength with a fast moving cricket ball?
- (b) Calculate the de-Broglie wavelength of 1 MeV proton.
- (c) What does the square of wave function signify?
- (d) Explain the terms 'expectation value' and 'eigen value'.
- (e) What is the importance of normalizing a wave function?
- (f) Prove quantum mechanically that a particle will not exist in a box if its energy is zero.
- (g) What is Tunnel effect?
- (h) Explain 'Auger effect'.
- (i) State and explain Moseley's law.
- (j) What are Stoke's lines?

**SECTION-B**

2. Explain formation of a Gaussian wave packet. Plot graphically and explain its properties.
3. What do you mean by normalized wave function? Elaborate relationship between normalization and conservation of probability.
4. Explain probability current and probability density. Show that the change in probability density in a region of space is equal to the net change in probability current into that region.
5. Solve the Schrodinger's wave equation for a particle in one dimensional rectangular potential well of finite depth.
6. How X-rays are produced? Distinguish between continuous and characteristic X-ray spectra. Why are the characteristic spectra so called?
7. Show vibrational and rotational energy levels of a diatomic molecule on a potential energy versus inter-atomic distance curve. Explain the formation of these levels.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**