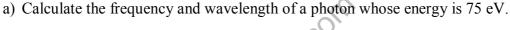


B.Sc.(CS) (2013 & Onwards) (Sem.-4) **QUANTUM MECHANICS** Subject Code : BCS-404 Paper ID : [72320]

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has to attempt any FOUR questions.

b) Calculate the de-Broglie wavelength of an electron in first Bohr orbit of hydrogen atom.

SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks

SECTION-B contains SIX questions carrying TEN marks nnnneach and a student

**SECTION-A** 

- c) What is an eigen function and eigen value?
- d) What do you understand by a wavefunction?
- e) State Ehrenfest theorem
- f) What are orthogonal wave functions?
- g) What is tunnel effect?
- h) What is Moseley law?
- i) State the difference between molecular and atomic orbitals.
- i) What is Raman effect?

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## Total No. of Questions: 07

**INSTRUCTION TO CANDIDATES :** 

Total No. of Pages : 02

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Time: 3 Hrs.

each.

Answer briefly :

1.

2.

1.

Roll	No						



Max. Marks: 60



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## **SECTION-B**

- 2. Define phase velocity and group velocity of a wave packet. Derive a relation between group velocity and phase velocity. Show that the particle velocity is equal to the group velocity of a wavepacket.
- 3. What is normalization of a wavefunction? How it is mathematically expressed? Find out the normalization factor for a wave function. Prove that normalization is independent of time.
- 4. Explain formation of a Gaussian wave packet. Plot graphically and explain its properties.
- 5. A particle of mass 'm' is confined to a one dimensional box of length 'l'. Derive the expression for (i) wave function (ii) probability density of the particle. Show these on separate graphs.
- 6. Obtain the time independent Schrodinger equation and solve it in the case of a particle in one dimensional rectangular potential well of finite width.
- 7. Obtain an expression for rotational energy levels of a diatomic molecule and the frequency of rotational spectra. State clearly the selection rules. In which region of the electromagnetic spectrum do the rotational spectra of molecule lie?