USN ☐☐☐☐☐☐☐☐☐☐ **10NT43**

Fourth Semester B.E. Degree Examination, June/July 2016
Introduction to Quantum Mechanics

Time: 3 hrs.

Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1 a. Explain the Inadequacy of classical physics. **(06 Marks)**
   b. Define uncertainity and complementarity. Prove uncertainity principle with help of localization experiment. **(10 Marks)**
   c. Explain wave packet and write the physical significance. **(04 Marks)**

2 a. Derive Schrödinger's wave equation for one dimensional and extend it to three dimensions of inclusive forces. **(12 Marks)**
   b. Describe statistical interpretation and normalization of wave function. **(08 Marks)**

3 a. Explain Hermitian, unitary and projection operators, commuting operators. **(09 Marks)**
   b. Explain matrix representation of an operator. **(05 Marks)**
   c. Write a short note on Hilbert space. **(06 Marks)**

4 a. Explain the fundamental postulates of Quantum mechanics. **(10 Marks)**
   b. Explain explicit representation of operators. **(05 Marks)**
   c. Write a note on Poisson brackets and commutator brackets. **(05 Marks)**

PART – B

5 a. Derive an expression for Harmonic oscillators. **(10 Marks)**
   b. Derive an expression for Rigid rotator. **(10 Marks)**

6 a. Derive an expression for free particle confined to 3 dimensional box. **(10 Marks)**
   b. Explain Electron energy bands in conductors, insulators and semi conductors. **(10 Marks)**

7 Explain with appropriate derivation the time independent and time dependent perturbation theory for non – degenerate an degenerate energy levels. **(20 Marks)**

8 a. Differentiate between reversible and irreversible computation with examples. **(06 Marks)**
   b. State and explain Moore's law. **(05 Marks)**
   c. Write note on Quantum computation and Quantum Bits. **(09 Marks)**

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