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10NT43

Fourth Semester B.E. Degree Examination, June/July 2015
Introduction to Quantum Mechanics

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Discuss the shortcomings of classical physics and origin of quantum mechanics. **(10 Marks)**
b. Discuss the physical significance of wave packets in space and time. **(10 Marks)**

2 Write note on :
a. Statistical interpretation of wave function
b. Normalization of wave function
c. Expectation value
d. Ehrenfests theorem. **(20 Marks)**

3 What are quantum mechanical operators? Explain any four quantum mechanical operators with suitable examples. **(20 Marks)**

4 a. Obtain solution for energy eigen value of a harmonic oscillator by matrix method. **(10 Marks)**
b. Write note on fundamental postulates of quantum mechanics. **(10 Marks)**

PART – B

5 a. Obtain expression for energy of a one dimensional linear harmonic oscillator. **(10 Marks)**
b. Obtain expression for energy of a particle in a three dimensional box. **(10 Marks)**

6 a. Discuss the quantum mechanics of a free particle confined to a ring. **(10 Marks)**
b. Writ note on density of states. **(10 Marks)**

7 Discuss the application of time independent perturbation theory for non–degenerate energy levels and evaluate first and second order wave functions and energy equations. **(20 Marks)**

8 a. What do you mean by quantum computing? Discuss the historical development of quantum computation. **(10 Marks)**
b. Write note on :
i) Quantum bits
ii) Quantum logic. **(10 Marks)**

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