

# CBCS Scheme

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15NT61

## Sixth Semester B.E. Degree Examination, June/July 2018 Quantum Mechanics and Simulation Techniques

Time: 3 hrs.

Max. Marks: 80

**Note: Answer FIVE full questions, choosing one full question from each module.**

### Module-1

- 1 a. Derive an expression for Schrödinger wave equation for a freely moving particle in one dimension. (10 Marks)  
b. Write a note on uncertainty principle and complementarity. (06 Marks)

OR

- 2 a. Explain summary of principal experiments and inferences. (05 Marks)  
b. Give a short note on Experimental background. (05 Marks)  
c. Derive an expression of Schrodinger wave equation for a freely moving particle in 3 dimensions. (06 Marks)

### Module-2

- 3 a. State and explain fundamental postulates of quantum mechanics. (10 Marks)  
b. Explain Poisson and commutator brackets along with the properties. (06 Marks)

OR

- 4 a. Discuss Expectation value and Probabilities in detail. (08 Marks)  
b. Describe quantum mechanical operators in detail (08 Marks)

### Module-3

- 5 a. Define Quantum bits. Explain with the help of a Bloch Sphere. (08 Marks)  
b. Define Quantum computation. Add a note on properties of quantum computation. (08 Marks)

OR

- 6 a. Write a short note on Natural phenomena as computing process. Explain quantum logic. (08 Marks)  
b. Discuss historical development of quantum computation. (08 Marks)

### Module-4

- 7 a. Describe Virtual environment technology in detail. (08 Marks)  
b. Write a note on applications of virtual environment technology. (08 Marks)

OR

- 8 a. Give a short note on advantages of simulators. (06 Marks)  
b. Explain the following : i) Telesurgery and ii) Endoscopy. (10 Marks)

### Module-5

- 9 a. Briefly discuss Monte Carlo method in detail. (10 Marks)  
b. Discuss Protein Data Bank in detail. (06 Marks)

OR

- 10 a. Describe "Heme" in detail with structure. (06 Marks)  
b. Distinguish Z, A and B DNA structures in detail (10 Marks)

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