



Indian Institute of Information Technology, Allahabad

Department of Applied Sciences

Syllabus

1. **Name of the Course: Quantum Computing and Information**
2. **L-T-P= 3-1-0**

Component	Topics for Coverage
Component 1	Postulates of Quantum Mechanics, Dirac notation, States & observables, Hermitian and Unitary operators, Density operators, Bloch sphere representation, Quantum Measurements, Composite systems, Entanglement, Bell's states, Schmidt decomposition.
	Qubits, Quantum Gates, Quantum circuits, Quantum No Cloning Theorem and Teleportation, Quantum Fourier Transform.
Component 2	Simple quantum algorithms-Deutsch Algorithm, Deutsch-Jozsa Algorithm, Simon Problem, etc.
	EPR paradox and Bell's inequality, Classical and quantum information, Shannon entropy, and data compression. Mutual information, Von Neuman entropy.

Text: I. M. Nielsen and I. Chuang, Quantum Computation & Information, Cambridge University Press; Anniversary edition (9 December 2010).

References:

1. Modern Quantum Mechanics by J. J. Sakurai;
2. John Preskill's notes on his homepage;
3. Umesh Vazirani's lecture notes.