NOC:Quantum Information and Computing - Video course

COURSE OUTLINE

The course is Primarily for Students of Physics and Engineering having exposure to basic quantum mechanics and knowledge of Linear Algebra.

COURSE DETAIL

Sl. No.	Topics
1.	Why Quantum Computing?
2.	Postulates of Quantum Mechanics – I
3.	Postulates of Quantum Mechanics – II
4.	Qubits and Bloch Sphere
5.	Basic Quantum Gates
6.	Quantum Circuits
7.	Quantum No Cloning Theorem and Teleportation
8.	Dense coding
9.	Density Matrix-I

NP-TEL

NPTEL

http://nptel.ac.in

Physics

Pre-requisites:

Familiarity with linear algebra and basic quantum mechanics is required.

Coordinators:

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10.	Density Matrix – II
11.	Projective measurement
12.	POVM
13.	EPR and Bell's Inequalities-I
14.	Bell's Inequalities – II
15.	Deutsch Algorithm
16.	Deutsch-Jozsa Algorithm
17.	Simon Problem
18.	Grover's Search Algorithm – I
19.	Grover's Search Algorithm –II
20.	Grover's Search Algorithm –III
21.	Grover's Search Algorithm –IV
22.	Quantum Fourier Transform –I
23.	Quantum Fourier Transform –II
24.	Period Finding
25.	Method of Continued Fraction
26.	Shor's Factorization Algorithm

27.	Shor's Factorization Algorithm
28.	Quantum Error Correction Codes
29.	Quantum error Correction Codes
30.	Classical Information Theory
31.	Shannon Entropy -I
32.	Shannon entropy-II
33.	Von Neumann Entropy-I
34.	Von Neumann Entropy –II
35.	Classical Cryptography
36.	RSA Algorithm
37.	Quantum Cryptography – BB 84 protocol
38.	B-92 and Eckart protocol
39.	Practical realization of a quantum computer-I
40.	Practical Realization of Quantum Computer -II

References:

1. Michael A. Nielsen and Issac L. Chuang, "Quantum Computation and Information, Cambridge (2002).
2. Mikio Nakahara and Tetsuo Ohmi, "Quantum Computing", CRC Press (2008).
3. N. David Mermin, "Quantum Computer

Science",Cambridge (2007).