Semester	AUG 2022
Open to semester	7,13,21
Course code	**PH4323/PH6543**
Course title	**Quantum Information**
Credits	3 /3
Course Coordinator & participating faculty (if any)	M. S. Santhanam
Nature of Course	Lectures
Pre-requisites	Should have taken at least Quantum Mechanics - I course.
Objectives (goals, type of students for whom useful, outcome etc)	This is an introductory course on quantum computation and quantum information aimed at students who have already taken the first quantum mechanics course. At the end of the course, students should have gained a good understanding of basic notions and techniques quantum computation.
Course contents (details of topics /sections with no. of lectures for each)	Basic quantum physics : Quantum states, Schrodinger equation, density operators, unitary operators, no-cloning theorem. Basic ideas about classical computation. (2 lectures) Building blocks for quantum computation : Qubits, quantum gates, universal gates, measurements, quantum circuits. (5) Quantum entanglement : Schmidt decomposition, von Neumann entropy and other entanglement measures. Bell's inequalities. (4) Quantum algorithms : Quantum teleportation, superdense coding, Deutsch-Josza algorithm. (4) More quantum algorithms : quantum Fourier transform, prime factorisation, quantum search. (6) Quantum computers : physical implementation, working with quantum computers to implement simple algorithms using Qiskit toolkit. (6) Special topics (if time permits) : Quantum error-correction or quantum machine learning. (3)

Evaluation /assessment	End-Sem Examination-40% Mid-Sem Examination-30% Others-30%%
Suggested readings (with full list of authors, publisher, year, edn etc.)	1. Quantum computation and quantum information Michael Nielsen and Isaac Chuang (Cambridge University Press, 2006). 2. An introduction to quantum computing P. Kaye, R. Laflamme and M. Mosca, (Oxford Univ Press, 2010)