ITEC (2023-2024)

Quantum Computing and Information Science

1	**Name of the Institute**	Centre for Development of Advanced Computing, Mohali
2	**Name of the Course**	Quantum Computing and Information Science
3	**Proposed Dates and Duration of the Course in week**	17 August, 2023 – 06 September, 2023 3 Weeks
4	**Mode of Training**	Offline
5	**Start date**	17 August, 2023
6	**End date**	06 September, 2023
7	**Eligibility Criteria for Participants:** **A. Educational Qualification**	Technical Graduate with knowledge of Basic Electronics, Programming languages preferably python, Matrix Algebra, and brief understanding of quantum mechanics is helpful but not mandatory.
	B. Work Experience	Relevant Experience
	C. Age Limit	As per MEA guidelines
	D. Target group (Level of participants and target ministry/department etc. may be identified)	Government officials, Faculty members, Programmers
8	**Aims & Objectives of the Course**	• To make the participants understand what quantum computers can do and how they work. • To impart knowledge about typical quantum use cases/ applications. • To introduce the participants to Quantum Mechanics & Linear Algebra. • To impart understanding about quantum bits, quantum logic gates, and quantum algorithms etc. • To introduce the participants to quantum circuit simulator and python based software environment
9	**Content of the Course**	The course content are : • Introduction to Quantum Computing History of Quantum Computation & Quantum Information Science, Applications & Use cases. • Introduction to Quantum Computing Tools & Kits Circuit Composer, Quantum Information Science Kit, CIRQ Quantum Framework • Introduction to Python Programming

		Overview, Features, Installation, Data types, Strings, Operators & Expressions etc., Control Flow Instructions, Data Structures: Lists, Dictionaries, Tuples, Functions & Modules etc. • Quantum Mechanics & Linear Algebra Principles of Superposition, Entanglement, Young's Double Slit experiment, State space, Quantum measurement, Linear operators and Matrices, Pauli Matrices, Inner Products, Eigenvectors and eigenvalues etc. • Quantum Gates & Circuits Single/Multiple Qubit Gates, Quantum Circuits, Bell States • Quantum Algorithms Quantum Teleportation, Super Dense Coding, Grover's Search Algorithm, Shor's algorithm • Project
10	**Mode of Evaluation of Performance of the ITEC Participant**	Viva voce / PPTs/Practical