IBM

A1000-112

Assessment: Fundamentals of Quantum Computation Using Qiskit v0.2X Developer

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Question: 1

Which Qiskit class is used to create a quantum circuit that contains both quantum and classical registers?

A. QuantumRegister
B. ClassicalRegister
C. QuantumCircuit
D. AerSimulator

Answer: C

Explanation:
The QuantumCircuit class combines quantum and classical registers into a single circuit object.

Question: 2

In Qiskit, what does the method circuit.depth() return?

A. Number of qubits in the circuit
B. Number of classical bits in the circuit
C. Length of the longest chain of sequential (non-parallel) gates
D. Total number of gates in the circuit

Answer: C

Explanation: circuit.depth() computes the circuit depth, i.e., the maximum number of time steps required when parallel gates are executed simultaneously.

Question: 3

Which gate rotates a single qubit about the X-axis by an arbitrary angle θ?

A. H
B. Rx(θ)
C. Rz(θ)
D. S

Explanation:
Rx(θ) is the rotation-X gate that implements exp(-i θ x/2) on the Bloch sphere.

Question: 4

What is the effect of applying a Hadamard (H) gate to the state 10)?

A) Leaves the state unchanged

B) Produces $|1\rangle$

C) Creates the superposition $(|0\rangle+|1\rangle)/\sqrt{2}$

D) Creates the superposition $(|0\rangle-|1\rangle)/\sqrt{2}$

A. Option A
B. Option B
C. Option C
D. Option D

Answer: C

Explanation:
$H|0\rangle = (|0\rangle+|1\rangle)/\sqrt{2}$, mapping the north pole of the Bloch sphere to the +X direction.

Question: 5

Which multi-qubit gate implements a controlled-NOT operation with control qubit qo and target qubit q1?

A. CZ
B. CX
C. SWAP
D. CCX

Answer: B

Explanation:
The CX (or CNOT) gate flips the target qubit when the control qubit is | 1).

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