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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. $R_x(\theta)$
- C. $R_z(\theta)$
- D. S

Answer: B

Explanation:

$R_x(\theta)$ is the rotation-X gate that implements $\exp(-i \theta x/2)$ on the Bloch sphere.

Question: 4

What is the effect of applying a Hadamard (H) gate to the state $|0\rangle$?

- 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 q_0 and target qubit q_1 ?

- 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 $|1\rangle$.

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