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Fundamentals of Quantum Computation Using Qiskit v0.2X Developer

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Question: 1

Which method is used to display system information such as the available backends in Qiskit?

- A. `get_backend`
- B. `show_system_info`
- C. `get_system_info`
- D. `available_backends`

Answer: D

Explanation: The `available_backends` method in Qiskit is used to display system information, specifically the list of available backends (simulators or real devices) that can be used to execute quantum circuits. It returns a list of backend objects that can be further inspected or used for execution. Therefore, the correct answer is D) `available_backends`.

Question: 2

What is the output of the below snippet?

```
a = 1/np.sqrt(2)
desired_state = [a, np.sqrt(1-a**2)]
qc = QuantumCircuit(1)
qc.initialize(desired_state, 0)
back_sv = BasicAer.get_backend('statevector_simulator')
result = execute(qc, back_sv).result()
qc_sv = result.get_statevector(qc)
state_fidelity(desired_state, qc_sv)
```

- A. 0.5
- B. Error in executing `state_fidelity`

- C. 0
- D. 1.0

Answer: D

Explanation: The given code initializes a quantum circuit `qc` with a desired state obtained from `desired_state`. The circuit is then executed using the `statevector_simulator` backend obtained from `BasicAer`. The state vector obtained from the execution is stored in `qc_sv`. Finally, the `state_fidelity` function is used to compare the desired state with the obtained state vector. Since the desired state is initialized correctly in the circuit, the fidelity between the desired state and the obtained state vector should be 1.0, indicating a perfect match. Therefore, the correct answer is D) 1.0.

Question: 3

Which module in Qiskit is used to implement QASM (Quantum Assembly Language) code?

- A. `qiskit.ignis`
- B. `qiskit.aqua`
- C. `qiskit.transpiler`
- D. `qiskit.qasm`

Answer: D

Explanation: The `qiskit.qasm` module in Qiskit provides functionality to work with QASM, which is a low-level quantum assembly language used to describe quantum circuits. It offers features such as parsing, generation, and manipulation of QASM code. Therefore, the correct answer is D) `qiskit.qasm`.

Question: 4

Which module in Qiskit is commonly used for constructing visualizations of quantum circuits?

- A. qiskit.circuit
- B. qiskit.visualization
- C. qiskit.compiler
- D. qiskit.transpiler

Answer: B

Explanation: The `qiskit.visualization` module in Qiskit provides functionality for constructing visualizations of quantum circuits. It includes methods to create circuit diagrams, statevectorvisualizations, and other visual representations of quantum circuits. It is commonly used to generate visualizations for better understanding and analysis of quantum circuits. Therefore, the correct answer is B) `qiskit.visualization`.

Question: 5

Which Qiskit tool is commonly used for circuit visualization and plotting?

- A. Qiskit Terra
- B. Qiskit Aqua
- C. Qiskit Ignis
- D. Qiskit Visualization

Answer: A

Explanation: The Qiskit Terra module in Qiskit provides tools and functionality for working with quantum circuits. It includes various features for circuit visualization, plotting, and analysis. It allows users to visualize circuits using different styles and formats, making it a commonly used tool for circuit

visualization in Qiskit. Therefore, the correct answer is A) Qiskit Terra.

Question: 6

When comparing and contrasting quantum information, which of the following aspects is typically considered?

- A. Entanglement
- B. Classical encryption
- C. Bit manipulation
- D. Quantum teleportation

Answer: A

Explanation: When comparing and contrasting quantum information, one of the key aspects that is typically considered is entanglement. Entanglement is a fundamental feature of quantum mechanics, where two or more quantum systems become correlated in such a way that the state of one system cannot be described independently of the others. It plays a crucial role in various quantum information processing tasks and distinguishes quantum information from classical information. Therefore, the correct answer is A) Entanglement.

Question: 7

Which backend in Qiskit is commonly used for simulating quantum circuits using Python-based simulators?

- A. BasicAer
- B. IBMQ
- C. Aer
- D. QuantumCircuit

Answer: A

Explanation: The BasicAer module in Qiskit provides a collection of Python-based simulators for simulating quantum circuits. It includes simulators for statevector simulation, unitary simulation, and more. These simulators are commonly used for testing and debugging quantum circuits without requiring access to real quantum hardware. Therefore, the correct answer is A) BasicAer.

Question: 8

Which method is used to retrieve the measurement results from a quantum experiment in Qiskit?

- A. `get_statevector`
- B. `get_counts`
- C. `get_backend`
- D. `get_job_status`

Answer: B

Explanation: The `get_counts` method is used in Qiskit to retrieve the measurement results from a quantum experiment. After executing a quantum circuit, the measurement outcomes are recorded, and the `get_counts` method allows us to access the frequency of each measurement outcome. It returns a dictionary where the keys represent the measurement outcomes and the values represent the corresponding counts. Therefore, the correct answer is B) `get_counts`.

Question: 9

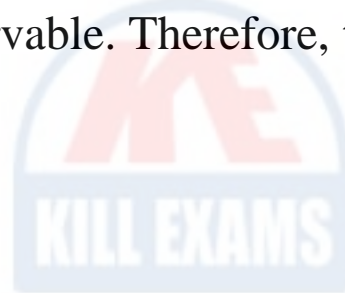
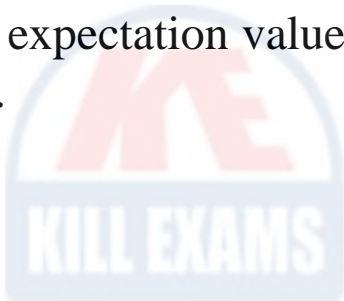
Which method is used to measure the expectation value of an observable in Qiskit?

- A. `measure_all`

- B. execute
- C. bind
- D. run

Answer: B

Explanation: The execute method in Qiskit is used to run a quantum circuit or experiment. It allows us to specify the backend (simulator or real device) on which the circuit should be executed. By executing a circuit, we obtain a result object, which can be used to access various information about the execution, including the expectation value of an observable. Therefore, the correct answer is B) execute.



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