Introduction to Quantum Computing and Artificial Intelligence

Computer Science · Answer Key · 22 Questions

1. What is the fundamental unit of quantum information?

A) Bit
B) Qubit
C) Byte
D) Neuron

2. Which quantum mechanical phenomenon allows a qubit to represent 0, 1, or both simultaneously?

A) Entanglement
B) Interference
C) Superposition
D) Decoherence

3. What is the quantum gate analogous to the classical NOT gate?

A) Hadamard gate
B) Pauli-X gate
C) CNOT gate
D) Quantum gate

4. Which quantum algorithm is known for efficiently factoring large numbers, impacting encryption?

A) Grover's Algorithm
B) Shor's Algorithm
C) Quantum Speedup
D) Hadamard's Algorithm

5. Quantum computers can potentially solve complex problems faster due to what capability?

A) Sequential processing
B) Parallel computations
C) Increased clock speed
D) Larger memory

6. What is a major challenge in quantum computing related to the sensitivity of quantum systems to external disturbances?

A) Scalability
B) Error Correction
C) Decoherence and Noise
D) Quantum Interference

7. What is the term for hypothetical AI capable of performing any intellectual task that a human can do?

A) Weak AI
B) Narrow AI
C) Artificial General Intelligence (AGI)
D) Expert System

8. Which subset of AI uses neural networks with many layers to analyze vast amounts of data?

A) Machine Learning
B) Natural Language Processing
C) Computer Vision
D) Deep Learning

9. What type of machine learning model is trained on labeled data to predict outputs?

A) Unsupervised Learning
B) Reinforcement Learning
C) Supervised Learning
D) Semi-supervised Learning

10. Which AI component enables computers to understand, interpret, and generate human language?

A) Computer Vision
B) Robotics
C) Natural Language Processing (NLP)
D) Machine Learning

11. What is an example of Narrow AI?

A) AGI
B) Voice Assistants
C) Human-like general intelligence
D) A robot that can do any human task

12. What is a potential ethical concern related to AI systems inheriting biases from their training data?

A) Increased computational power
B) Unfair outcomes
C) Improved accuracy
D) Job creation

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13. What technology promises ultra-secure communication methods that are theoretically immune to eavesdropping?

A) Classical encryption
B) Shor's Algorithm
C) Quantum key distribution (QKD)
D) RSA encryption

14. What capability of quantum computing is beneficial for drug discovery and material science?

A) Factoring large numbers
B) Simulating molecular interactions
C) Searching unsorted databases
D) Performing parallel computations

15. In the context of quantum computing, what does the Hadamard gate (H-gate) do?

A) Flips the state of a qubit
B) Creates entanglement
C) Creates superposition
D) Performs a classical NOT operation

16. What is a quantum circuit composed of?

A) Bits
B) Qubits
C) A series of quantum gates
D) Classical logic gates

17. What is a potential consequence of AI replacing jobs in various sectors?

A) Increased demand for AI developers
B) Potential unemployment or job displacement
C) Greater efficiency in all tasks
D) Lower production costs

18. Who coined the term "Artificial Intelligence"?

A) Alan Turing
B) John McCarthy
C) Tim Berners-Lee
D) Bill Gates

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19. What is the primary objective of AI?

A) To create machines that can only perform specific tasks
B) To develop systems that can perform tasks requiring human-like thinking and reasoning
C) To replace all human jobs
D) To process data faster than any human

20. What is the era of quantum computing characterized by limited qubit counts and error rates called?

A) Quantum Supremacy
B) Quantum Leap
C) NISQ (Noisy Intermediate-Scale Quantum)
D) Quantum Age

21. Which quantum algorithm quadratically speeds up searching in unsorted databases?

A) Shor's Algorithm
B) Grover's Algorithm
C) Quantum Interference
D) Entanglement Algorithm

22. What is a key component of AI that allows machines to learn from data without explicit programming?

A) Deep Learning
B) Natural Language Processing
C) Machine Learning
D) Computer Vision