1. Which algorithm efficiently computes the Discrete Fourier Transform (DFT) for a sequence of length (N)?

a) FFT algorithm
b) DWT algorithm
c) IDFT algorithm
d) DCT algorithm

Answer: a) FFT algorithm

Explanation: The Fast Fourier Transform (FFT) algorithm is specifically designed to efficiently compute the DFT for a sequence of length (N) by reducing the computational complexity from (O(N^2)) to (O(N \log N)).

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2. What is the primary technique used in the FFT algorithm to reduce computational complexity?

a) Decimation in Time
b) Decimation in Frequency
c) Convolution
d) Interpolation

Answer: a) Decimation in Time

Explanation: The FFT algorithm primarily utilizes the technique of decimation in time to divide

the computation into smaller DFTs, reducing the overall computational complexity.

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3. In the context of the FFT algorithm, what does ‘decimation’ refer to?

a) Sampling
b) Downsizing
c) Filtering
d) Quantization

Answer: b) Downsizing

Explanation: Decimation in the FFT algorithm involves downsizing the computation by dividing the input sequence into smaller subsequences, reducing the computational complexity.

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4. Which FFT algorithm variant is most suitable for sequences whose length is a power of 2?

a) Radix-2 FFT
b) Radix-4 FFT
c) Cooley-Tukey FFT
d) Bluestein FFT

Answer: a) Radix-2 FFT

Explanation: Radix-2 FFT is specifically optimized for sequences whose length is a power of 2, providing efficient computation in (O(N \log N)) time complexity.

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5. Which of the following is NOT a step in the decimation in time FFT algorithm?

a) Divide
b) Conquer
c) Combine
d) Multiply

Answer: b) Conquer

Explanation: The decimation in time FFT algorithm involves the steps of dividing, multiplying, and combining smaller DFTs to compute the overall DFT efficiently.

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6. Which FFT algorithm variant is particularly advantageous for sequences with prime factors other than 2?

a) Bluestein FFT
b) Radix-2 FFT

c) Cooley-Tukey FFT
d) Radix-4 FFT

Answer: a) Bluestein FFT

Explanation: Bluestein FFT is beneficial for sequences with prime factors other than 2, as it handles composite lengths efficiently by transforming them into lengths that are powers of 2.

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7. What is the primary technique used in the decimation in frequency FFT algorithm?

a) Time-reversal
b) Frequency-domain filtering
c) Convolution
d) Amplitude modulation

Answer: b) Frequency-domain filtering

Explanation: Decimation in frequency FFT algorithm primarily involves filtering the frequency domain representation of the input sequence to reduce computational complexity.

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8. Which FFT algorithm variant is based on the divide-and-conquer strategy?

a) Cooley-Tukey FFT
b) Radix-2 FFT
c) Bluestein FFT
d) Mixed-radix FFT

Answer: a) Cooley-Tukey FFT

Explanation: Cooley-Tukey FFT algorithm employs the divide-and-conquer strategy to break down the DFT computation into smaller DFTs, which are then combined to obtain the final result efficiently.

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9. What is the primary advantage of the decimation in frequency FFT algorithm over decimation in time FFT algorithm?

a) Better numerical stability
b) Lower memory requirement
c) Reduced arithmetic complexity
d) Higher precision

Answer: b) Lower memory requirement

Explanation: Decimation in frequency FFT algorithm typically requires lower memory usage compared to decimation in time FFT algorithm, making it advantageous in memory-constrained environments.

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10. Which FFT algorithm variant is particularly useful for sequences with mixed prime factors?

a) Mixed-radix FFT
b) Radix-2 FFT
c) Cooley-Tukey FFT
d) Bluestein FFT

Answer: a) Mixed-radix FFT

Explanation: Mixed-radix FFT algorithm is beneficial for sequences with mixed prime factors, as it can efficiently handle composite lengths by employing different radix sizes for factorization.