1. Which transform is commonly used for signal compression and energy compaction?
a) Cosine transform
b) Sine transform
c) Walsh transform
d) Hadamard transform

Answer: a) Cosine transform
Explanation: The cosine transform, particularly the Discrete Cosine Transform (DCT), is widely used in signal compression algorithms like JPEG for its ability to concentrate signal energy into fewer coefficients, facilitating efficient compression while preserving image quality.

2. What property makes the Haar transform suitable for image analysis in computer vision?
a) Energy compaction
b) Orthogonality
c) Shift-invariance
d) Frequency localization

Answer: b) Orthogonality
Explanation: The Haar transform’s orthogonality property allows for efficient representation of signals in terms of coefficients that are uncorrelated, making it suitable for tasks like feature extraction and pattern recognition in image analysis.

3. Which transform is primarily used for signal denoising and data compression in telecommunications?
a) Slant transform
b) KL transform
c) Walsh transform

d) Sine transform

Answer: b) KL transform
Explanation: The Karhunen-Loève (KL) transform, also known as the Principal Component Analysis (PCA), is commonly used in telecommunications for its ability to compactly represent signals by capturing the most significant features, making it useful for denoising and compression.

4. In which transform domain do the DC coefficients contain the most energy for natural images?
a) Hadamard transform
b) Walsh transform
c) Haar transform
d) Cosine transform

Answer: d) Cosine transform
Explanation: In the cosine transform domain, particularly with the Discrete Cosine Transform (DCT), DC coefficients typically contain the most energy for natural images due to their low-frequency components representing overall brightness or intensity.

5. Which transform is characterized by its sparse representation of signals, making it suitable for applications requiring sparse data representation?
a) Walsh transform
b) Hadamard transform
c) Slant transform
d) Haar transform

Answer: d) Haar transform
Explanation: The Haar transform provides a sparse representation of signals, particularly those with sudden changes or edges, making it suitable for applications like image compression and feature extraction where sparse data representation is advantageous.

6. What property of the Walsh transform makes it useful in digital communications for its ability to mitigate multipath interference?
a) Shift-invariance
b) Orthogonality
c) Frequency localization
d) Energy compaction

Answer: b) Orthogonality
Explanation: The orthogonality property of the Walsh transform enables it to efficiently separate signals transmitted over multiple channels, making it useful in digital communications to mitigate multipath interference and enhance signal detection.

7. Which transform is closely related to the discrete Fourier transform (DFT) but uses only real-valued coefficients?
a) Cosine transform
b) Sine transform
c) Walsh transform
d) Haar transform

Answer: a) Cosine transform
Explanation: The cosine transform, particularly the Discrete Cosine Transform (DCT), is closely related to the DFT but uses only real-valued coefficients, making it computationally

efficient and suitable for applications like image and audio compression.

8. Which transform is particularly suitable for analyzing periodic signals due to its frequency-domain representation?
a) Sine transform
b) Haar transform
c) Walsh transform
d) Hadamard transform

Answer: a) Sine transform
Explanation: The sine transform is particularly suitable for analyzing periodic signals as it provides a frequency-domain representation that emphasizes sinusoidal components, making it useful in applications like spectral analysis and signal processing.

9. Which transform is used for feature extraction in image processing and computer vision due to its ability to capture gradient information?
a) Haar transform
b) Slant transform
c) Walsh transform
d) Cosine transform

Answer: a) Haar transform
Explanation: The Haar transform is commonly used for feature extraction in image processing and computer vision due to its ability to capture gradient information efficiently, making it useful for tasks like edge detection and texture analysis.

10. Which transform is commonly employed in signal processing for its ability to analyze non-

stationary signals with varying frequency content over time?
a) Slant transform
b) Cosine transform
c) Walsh transform
d) Short-time Fourier transform (STFT)

Answer: d) Short-time Fourier transform (STFT)
Explanation: The STFT is commonly employed in signal processing for its ability to analyze non-stationary signals by computing the Fourier transform over short, overlapping time intervals, allowing for analysis of signals with varying frequency content over time.