Sample Questions

Computer Engineering

Subject Name: Digital Signal and Image Processing **Semester: VI**

Multiple Choice Questions

	Choose the correct option for following questions. All the Questions carry equal marks
1.	If x(n) is a discrete-time signal, then the value of x(n) at non integer value of 'n' is:
Option A:	Zero
Option B:	Positive
Option C:	Negative
Option D:	Not defined
Answer	Not defined
2.	The function given by the equation x(n)=1, for n=0; and x(n) =0, for n ≠ 0 is
Option A:	Step function
Option B:	Ramp function
Option C:	Triangular function
Option D:	Impulse function
Answer	Impulse function
3.	Which of the following should be done in order to convert a continuous-time signal to a discrete-time signal?
Option A:	Sampling
Option B:	Differentiating
Option C:	Integrating
Option D:	None of the mentioned
Answer	Sampling
4.	What is output signal when a signal x(t)=cos (2*pi*40*t) is sampled with a sampling frequency of 20Hz?
Option A:	cos(pi*n)
Option B:	cos(2*pi*n)
Option C:	cos(4*pi*n)
Option D:	cos(8*pi*n)
Answer	cos(4*pi*n)
5.	Which of the following is true regarding the number of computations requires to compute an N-point DFT?
Option A:	N2 complex multiplications and N(N-1) complex additions
Option B:	N2 complex additions and N(N-1) complex multiplications
Option C:	N2 complex multiplications and N(N+1) complex additions
Option D:	N2 complex additions and N(N+1) complex multiplications
Answer	N2 complex multiplications and N(N-1) complex additions
6.	What is the DFT of the four point sequence x(n)={0,1,2,3}?
Option A:	{6,-2+2j-2,-2-2j}
Option B:	{6,-2-2j,2,-2+2j}
Option C:	{6,-2+2j,-2,-2-2j}
Option D:	{6,-2-2j,-2,-2+2j}

Answer	{6,-2+2j,-2,-2-2j}
7.	What is the order of the four operations that are needed to be done on h(k) in order to convolute x(k) and h(k)? Step-1:Folding Step-2:Multiplication with x(k) Step-3:Shifting Step-4:Summation
Option A:	1-2-3-4
Option B:	1-2-4-3
Option C:	2-1-3-4
Option D:	1-3-2-4
Answer	1-3-2-4
8.	An LTI system is said to be causal if and only if?
Option A:	Impulse response is non-zero for positive values of n
Option B:	Impulse response is zero for positive values of n
Option C:	Impulse response is nonzero for negative values of n
Option D:	Impulse response is zero for negative values of n
Answer	Impulse response is zero for negative values of n
9.	If x(n)=(0,0,1,1,1,1,1,0) then x(3n+1) is?
Option A:	(0,1,0,0,0,0,0,0)
Option B:	(0,0,1,1,1,1,0,0)
Option C:	(1,1,0,0,0,0,0,0)
Option D:	None of the mentioned
Answer	(0,1,0,0,0,0,0,0)
10.	Which function has a provision of determining the similarity between the signal and its delayed version?
Option A:	Auto-correlation Function
Option B:	Cross-correlation Function
Option C:	Convolution Function
Option D:	DFT function
Answer	Auto-correlation Function
11.	Which property is exhibited by the auto-correlation function of a complex valued signal?
Option A:	Commutative property
Option B:	Distributive property
Option C:	Conjugate property
Option D:	Associative property
Answer	Conjugate property
12.	In 4-neighbours of a pixel p, how far are each of the neighbours located from p?
Option A:	one pixel apart
Option B:	four pixels apart
Option C:	alternating pixels
Option D:	none of the Mentioned
Answer	one pixel apart
13.	What is the technique for a gray-level transformation function called, if the transformation would be to produce an image of higher contrast than the original by darkening the levels below some gray-level m and brightening the levels above m in the original image.
Option A:	Contouring
Option B:	Contrast stretching

Option C:	Mask processing
Option D:	Point processing
Answer	Contrast stretching
14.	What does the bilinear Interpolation do for gray-level assignment?
Option A:	Assign gray level to the new pixel using its right neighbor
Option B:	Assign gray level to the new pixel using its left neighbor
Option C:	Assign gray level to the new pixel using its four nearest neighbors
Option D:	Assign gray level to the new pixel using its eight nearest neighbours
Answer	Assign gray level to the new pixel using its four nearest neighbors
12	For pixels p(x, y), q(s, t), the Euclidean distance between p and q is defined as:
Option A:	$D(p, q) = [(x – s)^2 + (y – t)^2]^{1/2}$
Option B:	$D(p, q) = \|x – s\| + \|y – t\|$
Option C:	$D(p, q) = \max (\|x – s\| + \|y – t\|)$
Option D:	None of the mentioned
Answer	$D(p, q) = [(x – s)^2 + (y – t)^2]^{1/2}$
16.	Highlighting the contribution made to total image by specific bits instead of highlighting intensity-level changes is called as:
Option A:	Bit-plane slicing
Option B:	Intensity Highlighting
Option C:	Byte-Slicing
Option D:	None of the Mentioned
Answer	Bit-plane slicing
17.	Which of the following in an image can be removed by using smoothing filter?
Option A:	Sharp transitions of brightness levels
Option B:	Sharp transitions of gray levels
Option C:	Smooth transitions of gray levels
Option D:	Smooth transitions of brightness levels
Answer	Sharp transitions of gray levels
18.	What is the full form of JPEG?
Option A:	Joint Photographs Expansion Group
Option B:	Joint Photographic Expansion Group
Option C:	Joint Photographic Experts Group
Option D:	Joint Photographic Expanded Group
Answer	Joint Photographic Experts Group
19.	Which of the following is the first fundamental step in image processing?
Option A:	Filtration
Option B:	Image Restoration
Option C:	Image Enhancement
Option D:	Image Acquisition
Answer	Image Acquisition
20.	What is the name of the tool that helps in zooming, shrinking, rotating, etc.?
Option A:	Filters
Option B:	Interpolation
Option C:	Sampling
Option D:	None of the above
Answer	Interpolation
21.	Intensity levels in 8-bit image are:_____.
Option A:	0—255
Option B:	0—1024

Option C:	0—128
Option D:	0--64
Answer	0—255
22.	The number of grey values are integer powers of:_____.
Option A:	3
Option B:	4
Option C:	8
Option D:	2
Answer	2
23.	The Overlap Save and Overlap Add methods are used to compute DFT of __.
Option A:	Short date sequence
Option B:	Moderate data sequence
Option C:	Big sample value sequence
Option D:	Long date sequence.
Answer	Long data sequence.
24.	D.I.T. is_____.
Option A:	Dissemination In Task.
Option B:	Degradation In Time.
Option C:	Dissemination In Time.
Option D:	Disadvantage in Time.
Answer	Dissemination In Time.
25.	In FFT, how many complex multiplications are required to compute X(k)?
Option A:	N(N+1)
Option B:	N(N-1)/2
Option C:	N2/2
Option D:	N(N+1)/2
Answer	N(N+1)/2
26.	If x(n) and X(k) are an N-point DFT pair, then X(k+N)=?
Option A:	X(-k)
Option B:	-X(k)
Option C:	-X(-k)
Option D:	X(k)
Answer	X(k)
27.	What is the name of process used to correct the power-law response phenomena?
Option A:	Beta correction
Option B:	Alpha correction
Option C:	Gamma correction
Option D:	Pie correction
Answer	Gamma correction
28.	Which of the following make an image difficult to enhance?
Option A:	Narrow range of intensity levels
Option B:	High noise
Option C:	Dynamic range of intensity levels
Option D:	All of the mentioned above
Answer	All of the mentioned above
29.	The circular convolution of two sequences in time domain is equivalent to_____.
Option A:	Square of multiplication of DFTs of two sequences
Option B:	Difference of DFTs of two sequences
Option C:	Summation of DFTs of two sequences

Option D:	Multiplication of DFTs of two sequences
Answer	Multiplication of DFTs of two sequences
30.	To convert a continuous sensed data into Digital form, which of the following is required?
Option A:	Sampling
Option B:	Quantization
Option C:	Both Sampling and Quantization
Option D:	Neither Sampling nor Quantization
Answer	Both Sampling and Quantization

Descriptive Questions

A particular digital image with eight quantization level has the following histogram perform histogram equalization. Give new equalized histogram.

Gray Levels	0	1	2	3	4	5	6	7
No. of Pixels belongs to gray level	200	170	130	60	60	80	140	160

Perform the histogram stretching so that the new image have dynamic range [0 -7].

Gray Levels	0	1	2	3	4	5	6	7
No. of Pixels belongs to gray level	100	90	85	70	0	0	0	0

Explain the procedure of Zooming an image using replication and interpolation with suitable example.

Find the convolution of the following sequencesi)
x(n)=u(n), h(n)=u(n-3)
ii) x(n)={1,2,-1,1}, h(n)={1,0,1,1}

For a periodic signal v(t) = 30sin(2*pi*100t) + 10cos(2*pi*300t) + 6 sin(2*pi*500t), find the fundamental frequency in rad/s and Nyquist sampling rate. Obtain the discrete signal x(n).

Determine the response of the relaxed system characterized by the impulse response $h[n]= 0.5^n u(n)$ and input $x[n]=2^n u(n)$.

If x(n) = {1,2,3,4} and h(n) = {1,2,3,2}
a) Find Circular Convolution using DFT and IDFT?
b) Find Linear Convolution using Circular Convolution using DFT and IDFT?

Find the output y(n) of a filter whose impulse response is h(n) = {1, 1, 1} and input signal x(n) = {3, -1, 0, 1, 3, 2, 0, 1, 2, 1} using overlap save method?

Obtain the convolution for two D.T. sequences $x(n) = u(n)$ and $y(n) = (0.5)^n u(n)$.

Two discrete time systems are connected in cascade $h_1(n) = (0.5)^n u(n)$ and $h_2(n) = (0.25)^n u(n)$. Determine unit sample response of cascade.

The Impulse response of DT- LTI system $h(n) = n\,(1/2)^n\,u(n)$. Determine whether thesystem is stable and casual?

A system has unit impulse response $h(n) = (1/3)^{n+1}\,u(n+1)$.Find the response for unit stepinput?

Find the output y(n) of a filter whose impulse response is h(n) = {1, 1, 1} and input signalx(n) = {3, -1, 0, 1, 3, 2, 0, 1, 2, 1} using overlap save method?

Perform bit plane slicing and obtain all bit planes of following image

7	**3**	**5**	**4**
6	**2**	**4**	**3**
5	**7**	**6**	**0**
6	**7**	**4**	**3**

Show that a high pass filter can be obtained as High Pass = Original – Low Pass

What is zero padding? What are its uses?

List and explain any four properties of DFT.

How many multiplications and additions are required to compute N point DFT using Radix-2 FFT?

Explain the procedure of neighborhood processing technique?

Distinguish between linear convolution and circular convolution of two sequences.

Let $x(n) = \cos(n.\pi/2)\,u(n)$. Find D.F.T. of x(n).

Compare the high pass and low pass filtering in spatial domain.

What are different applicators of DSP?

Distinguish between Discrete Signal and Analog signals.

What are different signals used for analysis of discrete time signals?

Obtain the autocorrelation of sequence $x(n) = a^n\,u(n)$, $0 < a < 1$

Find the signal energy of $(1/2)^n\,u(n)$?

Obtain the digital negative of the 8 bpp image

23	206	244	72	130
163	79	47	69	122
201	247	100	80	39
48	77	111	211	121

What effect would set to zero the higher-order bit planes have on the histogram of an imagein general?

The impulse response of a LTI system is h(n)={1,2,1,1}. What is the response of the signal to the input x(n)={1,2,3,4}?