

University of Mumbai

Examinations Commencing from 7th January 2021 to 20th January 2021

Program: Computer Engineering

Curriculum Scheme: Rev2016

Examination: BE Semester VII

Course Code: CSC701 and Course Name: Digital Signal and Image Processing

Time: 2 hour

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Determine the linear convolution sum of two sequences $x(n) = \{3, 2, 1\}$ and $h(n) = \{1, 2, 1, 2\}$
Option A:	$\{3,8,8,10,5,2\}$
Option B:	$\{3,8,7,10,5,2\}$
Option C:	$\{3,8,8,5,2\}$
Option D:	$\{3,8,10,5,2\}$
2.	Determine the discrete-time signal: $x(n)=1$ for $n \geq 0$ and $x(n)=0$ for $n < 0$
Option A:	Unit ramp sequence
Option B:	Unit impulse sequence
Option C:	Exponential sequence
Option D:	Unit step sequence
3.	Which condition determines the causality of the LTI system in terms of its impulse response?
Option A:	Only if the value of an impulse response is zero for all negative values of time
Option B:	Only if the value of an impulse response is unity for all negative values of time
Option C:	Only if the value of an impulse response is infinity for all negative values of time
Option D:	Only if the value of an impulse response is negative for all negative values of time
4.	Which of the following defines Nyquist frequency?
Option A:	The frequency of resonance for the filtering circuit
Option B:	The second harmonic
Option C:	The highest frequency limit of sampling
Option D:	The highest frequency component of a given analog signal
5.	If the output of the system of the system at any 'n' depends only the present or the past values of the inputs then the system is said to be:
Option A:	Linear
Option B:	Non-Linear
Option C:	Causal
Option D:	Non-causal
6.	Which among the following assertions represents a necessary condition for the existence of Fourier Transform of discrete time signal (DTFT)?
Option A:	Discrete Time Signal should be absolutely summable
Option B:	Discrete Time Signal should be absolutely multipliable
Option C:	Discrete Time Signal should be absolutely integrable

Option D:	Discrete Time Signal should be absolutely differentiable
7.	DIT algorithm divides the sequence into
Option A:	Positive and negative values
Option B:	Even and odd samples
Option C:	Upper higher and lower spectrum
Option D:	Small and large samples
8.	Fourier transform of unit impulse at origin is
Option A:	undefined
Option B:	infinity
Option C:	1
Option D:	0
9.	Product of two functions in spatial domain is what, in frequency domain
Option A:	correlation
Option B:	convolution
Option C:	Fourier transform
Option D:	fast Fourier transform
10.	DFT of the given sequence $x(n)=\{1, 0, -1, 0\}$ is
Option A:	$\{2, 2, 0, 0\}$
Option B:	$\{0, 0, 2, 2\}$
Option C:	$\{2, 0, 0, 2\}$
Option D:	$\{0, 2, 0, 2\}$
11.	The procedure done on a digital image to alter the values of its individual pixels is
Option A:	Neighborhood Operations
Option B:	Image Registration
Option C:	Geometric Spatial Transformation
Option D:	Single Pixel Operation
12.	How is array operation carried out involving one or more images?
Option A:	array by array
Option B:	pixel by pixel
Option C:	column by column
Option D:	row by row
13.	A pixel p at coordinates (x, y) has neighbors whose coordinates are given by: (x+1, y), (x-1, y), (x, y+1), (x, y-1) This set of pixels is called _____
Option A:	4-neighbors of p
Option B:	Diagonal neighbors
Option C:	8-neighbors
Option D:	16-neighbors
14.	Histogram equalization is used to
Option A:	Enhance the contrast of an image
Option B:	Remove the noises present in an image
Option C:	Find the contours present in an image

Option D:	Find the equality present in various regions.
15.	What is the sum of all components of a normalized histogram?
Option A:	1
Option B:	-1
Option C:	0
Option D:	2
16.	Which of the following is/are the simplest derivative operator?
Option A:	Laplacian
Option B:	Gradient
Option C:	Median
Option D:	High pass
17.	Mask used for line detection is
Option A:	Gaussian
Option B:	Laplacian
Option C:	Ideal
Option D:	Butterworth
18.	Dividing image into its object is called
Option A:	Division
Option B:	Segmentation
Option C:	Morphology
Option D:	Recognition
19.	Which of the following is not used for edge detection?
Option A:	Sobel
Option B:	Average
Option C:	Prewitt
Option D:	Robert
20.	Zero crossing operator use the following
Option A:	First derivative
Option B:	Second derivative
Option C:	Sobel operator
Option D:	Gaussian operator

Q2.	Solve any Four out of Six	5 marks each
A	Consider analog signal $x(t) = 2\sin(80\pi t)$. If sampling frequency is 60 Hz, find the sampled version of discrete time signal $x(n)$ also find an alias frequency corresponding to $F_s = 60$ Hz.	
B	$X(n) = \{2, 3, 1, 4\}$ and $y(n) = 3\delta(n-3) - 2\delta(n) + \delta(n-1) + 4\delta(n-2)$	Find the cross correlation
C	If IDFT of $X(k) = x(n) = \{2, 1, 2, 0\}$ using DFT properties evaluate the following 1) IDFT of $\{X(k-1)\}$ 2) IDFT of $\{X(k)$ circularly convolved with $X(k)\}$	
D	For the FIR digital filter with impulse response given by $h(n) = \delta(n) + 2\delta(n-2) + 3\delta(n-3)$ Sketch the magnitude response of the filter.	

E	Check for LTI system: $y(n)=2x(n-1)+x(2n)$
F	Find whether the given signal is energy signal or power signal with justification $X(n)=\cos(3\pi n/4)$

Q3.	Solve any Two Questions out of Three	10 marks each
A	Derive radix 2 DIT FFT flow graph and find FFT of the sequence $x(n)=\{1,2,3,4\}$	
B	Compute linear convolution of sequence $x(n)=\{5, 6, 2, 4, 1, 4, 5, 2, 3\}$ and $h(n)=\{2, 1, 3, 1\}$ using fast overlap save method.	
C	Explain Image enhancement techniques in detail.	