

# University of Mumbai

Examinations Commencing from 7<sup>th</sup> January 2021 to 20<sup>th</sup> January 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2016

Examination: BE Semester VII

Course Code: **CSC701** and Course Name: DSIP

Time: 2 hour

Max. Marks: 80

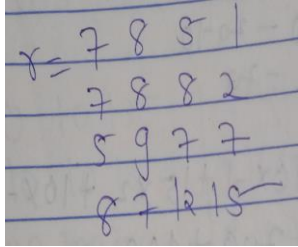
<b>Q1.</b>	<b>Choose the correct option for following questions. All the Questions are compulsory and carry equal marks</b>
1.	The function given by the equation $x(n)=1$ , for $n=0$ ; $x(n)=0$ , for $n \neq 0$ is a _____
Option A:	Step function
Option B:	Ramp function
Option C:	Triangular function
Option D:	Impulse function
2.	The odd part of a signal $x(t)$ is?
Option A:	$x(t)+x(-t)$
Option B:	$x(t)-x(-t)$
Option C:	$(1/2)*(x(t)+x(-t))$
Option D:	$(1/2)*(x(t)-x(-t))$
3.	The system described by the input-output equation $y(n)=nx(n)+bx^3(n)$ is a _____
Option A:	Static system
Option B:	Dynamic system
Option C:	Identical system
Option D:	Dyno system
4.	The system described by the input-output equations $y(n)=x^2(n)$ is a _____
Option A:	Nonlinear system
Option B:	Linear system
Option C:	Ramp system
Option D:	Energy system
5.	The system described by the input-output equations $y(n)=x(n)-x(n-1)$ is

Option A:	Time invariant
Option B:	Time variant
Option C:	Impulse system
Option D:	Step system
6.	DFT of sequence $x(n) = \{5,6,7,8\}$ is _____
Option A:	$\{26, -2+2j, -2, -2-2j\}$
Option B:	$\{26, -2-2j, -2, -2+2j\}$
Option C:	$\{26, -2+2j, 2, -2-2j\}$
Option D:	$\{24, -2+2j, -2, -2-2j\}$
7.	If $x(n)$ is a real sequence and $X(k)$ is its N-point DFT, then which of the following is true?
Option A:	$X(N-k)=X(-k)$
Option B:	$X(N-k)=X^*(k)$
Option C:	$X(-k)=X^*(k)$
Option D:	All of the mentioned
8.	What is the circular convolution of the sequences $x_1(n)=\{2,1,2,1\}$ and $x_2(n)=\{1,2,3,4\}$ ?
Option A:	$\{14,14,16,16\}$
Option B:	$\{16,16,14,14\}$
Option C:	$\{2,3,6,4\}$
Option D:	$\{14,16,14,16\}$
9.	If $X(k)$ is the N-point DFT of a sequence $x(n)$ , then circular time shift property says that N-point DFT of $x((n-l))_N$ is _____
Option A:	$X(k)e^{-j2\pi kl/N}$
Option B:	$X(k)e^{j2\pi kl/N}$
Option C:	$x(n)e^{-j2\pi nl/N}$
Option D:	$x(n)e^{j2\pi kl/N}$
10.	If $X(k)$ is the N-point DFT of a sequence $x(n)$ , then what is the DFT of $x^*(n)$ ?
Option A:	$X(N-k)$
Option B:	$X^*(k)$
Option C:	$X^*(N-k)$
Option D:	$-X^*(k)$
11.	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 as _____
Option A:	4-neighbors of $p$

Option B:	Diagonal Neighbors
Option C:	8-Neighbors
Option D:	16-Neighbors
12.	Two pixels p and q having gray values from v, the set of gray level values used to define adjacency are m-adjacent if
Option A:	q is in N5(p), q is in ND(p) and the set $N4(p) \cap N4(q)$ has no pixels whose values are from V
Option B:	q is in N4(p) , q is in ND(p) and the set $N4(p) \cup N4(q)$ has no pixels whose values are from V
Option C:	q is in N8(p) , q is in ND(p) and the set $N6(p) \cup N4(q)$ has no pixels whose values are from V
Option D:	q is in N8(p), q is in N4(p) and the set $N5(p) \cap N5(q)$ has no pixels whose values are from V
13.	Oldest source of EM radiations used for imaging
Option A:	Visible
Option B:	gamma
Option C:	x-rays
Option D:	Ultraviolet
14.	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
15.	Using gray level transformations, the basic function logarithmic

	deals with which of the following transformation									
Option A:	Log and Inverse-Log transformations									
Option B:	Negative and identity transformations									
Option C:	nth and nth root transformations									
Option D:	Contrast Stretching									
16.	If r be the gray level of image before processing and s after processing then which expression defines the negative transformation for the gray level in the range $[0, L-1]$									
Option A:	$S=L-1-r$									
Option B:	$S=cr^\gamma$ , c and $\gamma$ are positive constants									
Option C:	$S=c\log(1+r)$ , c is a constant and $r \geq 0$									
Option D:	$S=cr$									
17.	Convolution results of laplacian mask and following image are _____ <table border="1" style="margin-left: 20px;"> <tr> <td>1</td> <td>2</td> <td>1</td> </tr> <tr> <td>2</td> <td>4</td> <td>2</td> </tr> <tr> <td>4</td> <td>8</td> <td>4</td> </tr> </table>	1	2	1	2	4	2	4	8	4
1	2	1								
2	4	2								
4	8	4								
Option A:	[0 2 0; -1 2 -1; 6 20 6]									
Option B:	[0 0 2; 1 -2 1; -6 20 -6]									
Option C:	[2 0 0; 1 2 -1; 6 -20 6]									
Option D:	[0 2 0; 1 -2 -1; 6 20 6]									
18.	X-gradient image is _____ by applying sobel horizontal mask on the following image <table border="1" style="margin-left: 20px;"> <tr> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>2</td> <td>4</td> <td>2</td> </tr> <tr> <td>1</td> <td>4</td> <td>5</td> </tr> </table>	3	4	5	2	4	2	1	4	5
3	4	5								
2	4	2								
1	4	5								
Option A:	[-8 12 -8; 4 -2 0; 8 12 8]									

Option B:	[ -8 -12 -8;4 2 0;8 12 8]									
Option C:	[ 8 -12 -8;4 2 0;8 12 8]									
Option D:	[ -8 -12 8;4 2 0;8 12 8]									
19.	Y-gradient image is _____ by applying prewitt vertical mask on the following image <table border="1" style="margin-left: 20px;"> <tr> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>2</td> <td>4</td> <td>2</td> </tr> <tr> <td>1</td> <td>4</td> <td>5</td> </tr> </table>	3	4	5	2	4	2	1	4	5
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1	4	5								
Option A:	[-8 -2 8; -12 -6 12;-8 -4 8]									
Option B:	[8 2 8; -12 -6 12;-8 -4 8]									
Option C:	[-8 -2 8; 12 -6 12;-8 -4 8]									
Option D:	[-8 -2 8; -12 6 12;-8 -4 8]									
20.	DFT of sequence $x(n)$ is given by $X(K)=\{4, 1+2j, j, 1-3j\}$ . Then DFT of $x^*(n)$ is _____ using DFT property									
Option A:	$\{4, 1+3j, -j, 1-2j\}$									
Option B:	$\{4, 1-3j, -j, 1-2j\}$									
Option C:	$\{4, 1+3j, -j, 1+2j\}$									
Option D:	$\{4, 1+3j, j, 1-2j\}$									

<b>Q2</b> (20 Marks Each)	<b>Solve any Four out of Six</b>	<b>5 marks each</b>
A	Determine cross correlation of following two signals $x_1(n)=\{2,2,1,2\}$ and $x_2(n)=\{-2,-1,3,2\}$	
B	Determine energy and power of unit step signal.	
C	Explain 4 connectivity, 8 connectivity and m connectivity with the help of example	
D	Perform contrast stretching on the following 4 bpp image ( $r_1=4, r_2=9, s_1=2, s_2=13$ ) 	
E	Explain edge detection	
F	Calculate DFT of a sequence $x(n)=\{1,1,0,0\}$ and check the validity of your answer by calculating its IDFT.	

<b>Q3.</b> <b>(20 Marks Each)</b>	<b>Solve any Two Questions out of Three</b>	<b>10 marks each</b>																		
A	Determine whether the following system is linear,time invariant, Static,causal and stable or not $y(n)=4x(n)+2$																			
B	Derive radix 2 DIT-FFT algorithm and Determine circular convolution of following two sequences using radix 2 DIT-FFT algorithm $x(n)=\{1,2,1,4\}$ and $h(n)=\{1,2,3,2\}$																			
C	Equalize the given histogram <table border="1" data-bbox="459 564 810 878"> <thead> <tr> <th data-bbox="466 573 587 631">Grey level</th> <th data-bbox="593 573 804 609"><math>n_k</math></th> </tr> </thead> <tbody> <tr><td data-bbox="466 640 587 676">0</td><td data-bbox="593 640 804 676">100</td></tr> <tr><td data-bbox="466 685 587 721">1</td><td data-bbox="593 685 804 721">90</td></tr> <tr><td data-bbox="466 730 587 766">2</td><td data-bbox="593 730 804 766">50</td></tr> <tr><td data-bbox="466 775 587 810">3</td><td data-bbox="593 775 804 810">20</td></tr> <tr><td data-bbox="466 819 587 855">4</td><td data-bbox="593 819 804 855">0</td></tr> <tr><td data-bbox="466 864 587 900">5</td><td data-bbox="593 864 804 900">0</td></tr> <tr><td data-bbox="466 909 587 945">6</td><td data-bbox="593 909 804 945">0</td></tr> <tr><td data-bbox="466 954 587 990">7</td><td data-bbox="593 954 804 990">0</td></tr> </tbody> </table>	Grey level	$n_k$	0	100	1	90	2	50	3	20	4	0	5	0	6	0	7	0	
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