

# University of Mumbai

## Examination 2020

Examinations Commencing from 23<sup>rd</sup> December 2020 to 6<sup>th</sup> January 2021 and from 7<sup>th</sup> January 2021 to 20<sup>th</sup> January 2021

Program: **B.E. Computer Engineering**

Curriculum Scheme: 2012

Examination: BE Semester VII

Course Code: CPC701 and Course Name: Digital Signal 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.	$\delta(n) =$
Option A:	$u(n) + u(n - 1)$
Option B:	$u(n) u(n - 1)$
Option C:	$u(n) - u(n - 1)$
Option D:	$u(n - 1) - u(n)$
2.	For a power signal, $P =$ _____ and $E =$ _____
Option A:	Finite, Infinite
Option B:	Finite, Non-zero
Option C:	Infinite, Infinite
Option D:	Finite, Finite
3.	Find the cross correlation of two finite length sequences: $x(n) = \{2, 3, 1, 4\}$ and $y(n) = \{1, 3, 2, 1\}$
Option A:	$\{7, 13, 17, 14, 2, 13, 4\}$
Option B:	$\{2, 7, 13, 17, 14, 13, 4\}$
Option C:	$\{7, 13, 13, 14, 12, 13, 4\}$
Option D:	$\{7, 12, 17, 14, 3, 2, 5\}$
4.	The discrete time function defined as $u(n)=n$ for $n \geq 0$ ; $u(n)=0$ for $n < 0$ is an:
Option A:	Unit sample signal
Option B:	Unit step signal
Option C:	Unit ramp signal
Option D:	Unit Sequence signal
5.	What is the DFT of the four point sequence $x(n)=\{1, 2, 3, 4\}$ ?
Option A:	$\{10, -2+2j, -2, -2-2j\}$
Option B:	$\{10, -2, -2-2j, -2-2j\}$
Option C:	$\{-2, 10, 2+2j, 2-2j\}$
Option D:	$\{10, 10, 10, 2\}$
6.	For DIT FFT, the input is in _____ order and the output is in _____ order.

Option A:	bit reverse, normal
Option B:	normal,normal
Option C:	normal, bit reverse
Option D:	reverse, bit reverse
7.	In FFT there are _____ butterflies per stage of the computation process.
Option A:	$N*N$
Option B:	$N$
Option C:	$2N$
Option D:	$N/2$
8.	The total number of complex multiplications in FFT is _____
Option A:	$N/2\log_2 N$
Option B:	$N\log_2 N$
Option C:	$N*N$
Option D:	$2N$
9.	Time reversal of a discrete time signal refers to
Option A:	$y[n] = x[-n+k]$
Option B:	$y[n] = x[-n]$
Option C:	$y[n] = x[-n-k]$
Option D:	$y[n] = x[n-k]$
10.	What is the result of taking more samples during the quantization process?
Option A:	More errors in the analog-to-digital conversion
Option B:	More bit requirements
Option C:	More accurate signal representation
Option D:	More bit requirements and more accurate signal representation
11.	The cost of the digital processors is cheaper because
Option A:	Processor allows time sharing among a number of signals
Option B:	The hardware is cheaper
Option C:	Require less maintenance
Option D:	Less power consumption
12.	In DSP processors, which among the following maintains the track of addresses of input data as well as the coefficients stored in data and program memories?
Option A:	Data Address Generators (DAGs)
Option B:	Program sequences
Option C:	Barrel Shifter
Option D:	MAC
13.	Carl Pearson's Correlation Coefficient is a linear correlation coefficient that returns a value of between _____
Option A:	$-\pi$ and $\pi$
Option B:	0 and 1
Option C:	-1 and +1

Option D:	0 and $\pi$
14.	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
15.	For signal $x(n) = \left(\frac{1}{2}\right)^n u(n)$ what is the energy?
Option A:	4/3
Option B:	3/4
Option C:	1/2
Option D:	1
16.	If $x(n) = \{1, 2, 3, 4\}$ what is a circular shifted signal $x(-n+1)$ ?
Option A:	$\{1, 4, 3, 2\}$
Option B:	$\{4, 1, 2, 3\}$
Option C:	$\{2, 1, 4, 3\}$
Option D:	$\{4, 3, 2, 1\}$
17.	A system whose output response is given by $y(n) = x(n + 2)$
Option A:	Memoryless System
Option B:	Memory-Based System
Option C:	Static System
Option D:	Step System
18.	Discrete Fourier Transform of impulse signal is _____
Option A:	0
Option B:	$\frac{1}{2}$
Option C:	1
Option D:	N
19.	The discrete fourier transform of circular convolution of two signals $x(n)$ and $h(n)$ is equivalent to _____.
Option A:	Multiplication of DFTs of two sequences
Option B:	Addition of DFTs of two sequence
Option C:	Squaring of DFTs of two sequences
Option D:	Division of DFTs of two sequences
20.	The first M-1 values of the output sequence in every step of Overlap save method of filtering of long sequence are _____
Option A:	added
Option B:	discarded
Option C:	appended

Option D:	overlapped
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<b>Q2</b>	<b>Solve any Two Questions out of Three</b>	<b>10 marks each</b>
A	Explain any 5 properties of Discrete Fourier Transform	
B	For $x(n) = \{1, 3, -1, 2, 0, 4\}$ [ <i>Pointer at first value of the signal</i> ], plot the following discrete time signals (i) $x(n+2)$ (ii) $x(-n-1)$ (iii) $2x(n)$ (iv) $x(n-1) \cdot \delta(n-3)$ (v) $x(n) \cdot u(n-2)$	
C	Compute linear convolution of the causal sequences $x[n] = \{1, 2, 3, -1, 2, -2, 0, -1\}$ and $h[n] = \{-1, 2, 1\}$ using overlap save method.	

<b>Q3.</b>	<b>Solve any Two Questions out of Three</b>	<b>10 marks each</b>
A	Explain with the example significance of Carl's Correlation Coefficient Algorithm in digital signal processing.	
B	Write a detailed note on DSP Processor.	
C	<i>Write a detailed note on TMS320.</i>	