

University of Mumbai

Examinations Summer 2022

Program: Electronics Engineering

Examination: Third Year Semester-V Revised 2019 (C-Scheme)

Course Code: ELC502 and Course Name: Digital Signal processing

Time: 2 hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	FIR filters are always stable because it has _____
Option A:	Poles at Origin
Option B:	Poles at Infinity
Option C:	Zeros at Origin
Option D:	Zeros at Infinity
2.	Decimation is a process in which the sampling rate is _____
Option A:	Enhanced
Option B:	Stable
Option C:	Reduced
Option D:	Unpredictable
3.	If $x(n) = \{0, 1, 2, 3\}$ then its DFT is $X(K) = \{6, 2j-2, -2, ______ \}$
Option A:	$j+1$
Option B:	-6
Option C:	36
Option D:	$-2j-2$
4.	DFT is periodic means $X(K+N) = ______$
Option A:	$X(K)$
Option B:	$X^*(K)$
Option C:	$X(-K)$
Option D:	$X(K-N)$
5.	Which window function is also regarded as 'Raised-cosine window'?
Option A:	Hamming window
Option B:	Finite
Option C:	Infinite
Option D:	Long
6.	Which of the following is the disadvantage of sampling rate conversion by converting the signal into analog signal?
Option A:	Signal distortion
Option B:	Quantization effects
Option C:	New sampling rate can be arbitrarily selected
Option D:	Signal distortion & Quantization effects
7.	The width of the main-lobe in rectangular window spectrum is,
Option A:	$4\pi/N$
Option B:	$16\pi/N$
Option C:	$8\pi/N$
Option D:	$2\pi/N$
8.	In BLT, change in frequencies represents _____
Option A:	Warping

Option B:	Pre warping
Option C:	Expansion
Option D:	Compression
9.	In case of multirate DSP, to avoid unnecessary multiplications-----is used.
Option A:	Decimator
Option B:	Interpolator
Option C:	Polyphase filter
Option D:	Low pass filter
10.	In Impulse invariance method, mapping is
Option A:	One to one
Option B:	One to many
Option C:	Many to many
Option D:	Many to one

Q2	20 Marks
A	Solve any Two 5 marks each
i.	Explain the concept of pipelining in a DSP processor.
ii.	Compare IIR and FIR Filters.
iii.	Find the sequence $x(n)$ for which DFT $X(K)$ is given by $X(K) = \{3, (2+j), 1, (2-j)\}$
B	Solve any One 10 marks each
i.	Design linear phase FIR high pass filter using hamming window with cutoff frequency, $W_c = 0.8 \pi$ rad/sample and $N=7$.
ii.	Compute IDFT of the following sequence using the inverse FFT algorithm. $X(K) = \{3, 0, 3, 0, 3, 0, 3, 0\}$

Q3	Solve any Two Questions out of Three 10 marks each
A	Design a Butterworth lowpass filter to meet the following specifications. Passband gain=0.89 Passband frequency edge= 0.20 Attenuation=0.20 stop edge= 75Hz
B	Explain the overlap-add and overlap-save method for filtering of long data sequences.
C	Explain the application of DSP for Biomedical Signal Processing

Q4.	Solve any Two Questions out of Three 10 marks each
A	Find the DFT of the following sequence using the DIT FFT algorithm. $x(n) = \{1, 1, 1, 1, 1, 1, 0\}$
B	Explain the block diagram of general purpose Digital Signal Processor
C	Write a note on Polyphase filters.