

# University of Mumbai

Program: Electronics and Telecommunication Engineering

Curriculum Scheme: Rev201

Examination: TE Semester V

Course Code: ECC-504 and Course Name: Discrete Time Signal Processing

Time: 2 hour 30 minutes

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.	In bilinear transformation, the left-half s-plane is mapped to which of the following in the z-domain?
Option A:	Partially outside the unit circle $ z =1$
Option B:	Entirely outside the unit circle $ z =1$
Option C:	Entirely inside the unit circle $ z =1$
Option D:	Partially inside the unit circle $ z =1$
2.	Twiddle factor $W_4^3 =$
Option A:	j
Option B:	1
Option C:	-1
Option D:	-j
3.	$H_1[Z] = 1 + 0.25z^{-1}$ behaves like a _____ filter and $H_2[Z] = 1 - 0.25z^{-1}$ behaves like a _____ filter
Option A:	Low pass, High pass
Option B:	High pass, Low pass
Option C:	Band Pass, All pass
Option D:	All pass, Band pass
4.	In impulse invariant transformation method for $H(s) = \frac{1}{s-p}$ digital transformation is given as
Option A:	$H(z) = \frac{1}{1 - e^{pT} z^{-1}}$
Option B:	$H(z) = \frac{1}{1 - e^{-pT} z^{-1}}$
Option C:	$H(z) = \frac{1}{1 + e^{-pT} z^{-1}}$
Option D:	$H(z) = \frac{10}{1 + e^{pT} z^{-1}}$
5.	The Quantisation error in Analog to digital conversion (ADC) of a signal is said to be _____ error and this error is assumed to have a _____ probability distribution function (pdf)
Option A:	Truncation, Uniform

Option B:	Truncation, Gaussian
Option C:	Rounding, Uniform
Option D:	Rounding, Gaussian
6.	In the DTMF signal tone number 1 press generates _____ and _____ tones
Option A:	697 Hz and 1209 Hz
Option B:	770 Hz and 1336 Hz
Option C:	852 Hz and 1336 Hz
Option D:	941 Hz and 1209 Hz
7.	An FIR filter which has the following property $ \angle H(0) - \angle H(\pi)  = \pi$ behaves like an
Option A:	Minimum phase system
Option B:	Maximum phase system
Option C:	Mixed phase system
Option D:	Zero phase system
8.	The simultaneous fetch of code as data is done in _____ architecture
Option A:	Harvard architecture
Option B:	Von-Neumann architecture
Option C:	Very large instruction word architecture
Option D:	Modified Harvard architecture
9.	The relation between analog and digital frequency is nonlinear in case of
Option A:	Impulse invariant transformation.
Option B:	Bilinear transformation.
Option C:	Frequency sampling.
Option D:	chebyshev sampling..
10.	Range of Round off error for two's complement binary number representation with B number of bits is given as -----
Option A:	$-\left(\frac{2^{-B}}{2}\right) \leq \epsilon_R \leq \left(\frac{2^{-B}}{2}\right)$
Option B:	$-\left(2^{-B}\right) \leq \epsilon_R \leq 0$
Option C:	$-\left(2^{-B}\right) \leq \epsilon_R \leq \left(2^{-B}\right)$
Option D:	$-\left(2^{+B}\right) \leq \epsilon_R \leq 0$

<b>Q2.</b> <b>(20 Marks Each)</b>	<b>Solve any Two Questions out of Three</b>	<b>10 marks each</b>
A	<b>Find DFT of the following sequence using DIT FFT algorithm. <math>x(n)=\{1,1,1,1,1,1,0\}</math></b>	
B	<b>Differentiate between Butterworth and chebyshev filter</b>	

C	<b>Explain application of DSP for ECG Signal Analysis</b>
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<b>Q3.</b> (20 Marks Each)	<b>Solve any Two Questions out of Three</b>	<b>10 marks each</b>
A	<b>Differentiate IIR and FIR systems.</b>	
B	<b>Write a short note on Dual Tone Multi-Frequency Signal Detection.</b>	
C	<b>Design a FIR filter using window method for following specification. Use hamming window of length.</b>	

<b>Q4.</b> (20 Marks Each)	<b>Solve any Two Questions out of Three</b>	<b>10 marks each</b>
A	<b>What is multirate DSP? Where it is required?</b>	
B	<b>Write down the design steps for FIR filter using the window techniques. Compare windows.</b>	
C	<b>Explain application of DSP for Radar signal processing</b>	