University of Mumbai
Examination 2020- Inter Cluster

Program: BE Instrumentation Engineering

Curriculum Scheme: Revised 2012

Examination: Third Year Semester VI

Course Code: ISC603 and Course Name: Digital Signal Processing

Time: 1hour Max. Marks: 50

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Note to the students:- All Questions are compulsory and carry equal marks .

Q1.	1. If x(n) and X(k) are an N-point DFT pair, then X(k+N)=?
Option A:	X(-k)
Option B:	-X(k)
Option C:	X(k)
Option D:	X(K+N)
Q2.	If $X_1(k)$ and $X_2(k)$ are the N-point DFTs of $X_1(n)$ and $x_2(n)$ respectively, then what is the N-point DFT of $x(n)=ax_1(n)+bx_2(n)$?
Option A:	$X_1(ak)+X_2(bk)$
Option B:	$aX_1(k)+bX_2(k)$
Option C:	$e^{ak}X_1(k)+e^{bk}X_2(k)$
Option D:	$X_1(k)+X_2(k)$
Q3.	What is the DFT of the sequences $X_1(n)=\{2,1,2,1\}$
Option A:	{6,0,2,0}
Option B:	{14,16,14,16}
Option C:	{14,14,16,16}
Option D:	{12,11,12,11}
Q4.	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}
Q5.	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:	X(K)=X(-K)
Q6.	What is the lowest order of the Butterworth filter with a pass band gain K_P=-1 dB

	at Ω_P=4 rad/sec and stop band attenuation greater than or equal to 20dB at Ω_S = 8 rad/sec?
Option A:	4
Option B:	5
Option C:	6
Option D:	3
Q7.	Which of the following is a frequency domain specification?
Option A:	$0 \geq 20 \log\|H(j\Omega)\|$
Option B:	$H(j\omega)$
Option C:	$\log\|H(j\Omega)\| \leq KS$
Option D:	H(S)
Q8.	. What is the order of the normalized low pass Butterworth filter used to design a analog band pass filter with -3.0103dB upper and lower cutoff frequency of 50Hz and 20KHz and a stop band attenuation 20dB at 20Hz and 45KHz?
Option A:	2
Option B:	3
Option C:	4
Option D:	5
Q9.	What is the stop band frequency of the normalized low pass Butterworth filter used to design a analog band pass filter with -3.0103dB upper and lower cutoff frequency of 50Hz and 20KHz and a stop band attenuation 20dB at 20Hz and 45KHz?
Option A:	2 rad/sec
Option B:	2.25 Hz
Option C:	2.25 rad/sec
Option D:	2 Hz
Q10.	What is the cutoff frequency of the Butterworth filter with a pass band gain K_P=-1 dB at Ω_P=4 rad/sec and stop band attenuation greater than or equal to 20dB at Ω_S=8 rad/sec?
Option A:	3.5787 rad/sec
Option B:	1.069 rad/sec
Option C:	6 rad/sec
Option D:	4.5787 rad/sec
Q11.	What is the formula for chebyshev polynomial $T_N(x)$ in recursive form?
Option A:	$2T_{N-1}(x) - T_{N-2}(x)$
Option B:	$2T_{N-1}(x) + T_{N-2}(x)$
Option C:	$2xT_{N-1}(x) + T_{N-2}(x)$
Option D:	$2xT_{N-1}(x) - T_{N-2}(x)$
Q12.	If all the poles have small magnitudes, then the rate of decay of signal is _____
Option A:	Slow
Option B:	Constant

Option C:	Rapid
Option D:	Random
Q13.	What is the value of chebyshev polynomial of degree 0?
Option A:	1
Option B:	0
Option C:	-1
Option D:	2
Q14.	What is the value of chebyshev polynomial of degree 0?
Option A:	1
Option B:	0
Option C:	-1
Option D:	2
Q15.	If one or more poles are located near the unit circle, then the rate of decay of signal is _____
Option A:	Slow
Option B:	Constant
Option C:	Rapid
Option D:	Random
Q16.	. If the ROC of the system function is the exterior of a circle of radius r < ∞, including the point z = ∞, then the system is said to be _____
Option A:	Stable
Option B:	Causal
Option C:	Anti causal
Option D:	None of the mentioned
Q17.	A linear time invariant system is said to be BIBO stable if and only if the ROC of the system function _____
Option A:	Includes unit circle
Option B:	Excludes unit circle
Option C:	Is an unit circle
Option D:	None of the mentioned
Q18.	In bilinear transformation, the left-half s-plane is mapped to which of the following in the z-domain?
Option A:	Entirely outside the unit circle |z|=1
Option B:	Partially outside the unit circle |z|=1
Option C:	Partially inside the unit circle |z|=1
Option D:	Entirely inside the unit circle |z|=1
Q19.	If all the poles of H(z) are inside the unit circle, then the system is said to be _____
Option A:	Only causal
Option B:	Only BIBO stable
Option C:	BIBO stable and causal

Option D:	BIBO unstable
Q20.	Which of the following rule is used in the bilinear transformation?
Option A:	Simpson's rule
Option B:	Backward difference
Option C:	Forward difference
Option D:	Trapezoidal rule
Q21.	. If $s=\sigma+j\Omega$ and $z=re^{j\omega}$, then what is the condition on σ if r<1?
Option A:	$\sigma > 0$
Option B:	$\sigma < 0$
Option C:	$\sigma > 1$
Option D:	$\sigma < 1$
Q22.	If $s=\sigma+j\Omega$ and $z=re^{j\omega}$ and r=1, then which of the following inference is correct?
Option A:	LHS of the s-plane is mapped inside the circle, |z|=1
Option B:	RHS of the s-plane is mapped outside the circle, |z|=1
Option C:	Imaginary axis in the s-plane is mapped to the circle, |z|=1
Option D:	|Z|=1, for all
Q23.	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
Q24.	If $s=\sigma+j\Omega$ and $z=re^{j\omega}$, then what is the condition on σ if r>1?
Option A:	$\sigma > 0$
Option B:	$\sigma < 0$
Option C:	$\sigma > 1$
Option D:	$\sigma < 1$
Q25.	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