Program: BE BIOMEDICAL Engineering

Curriculum Scheme: Revised 2016

Examination: Third Year Semester V

Course Code: BMC504 and Course Name: BIOMEDICAL DIGITAL SIGNAL PROCESSING

Time: 1 hour | Max. Marks: 50

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

Q1.	The even 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))
Q2.	A unit ramp signal is
Option A:	energy signal
Option B:	Power signal
Option C:	neither energy nor power
Option D:	Both energy and power
Q3.	The discrete time function defined as x(n)=1 for n≥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:	Parabolic
Q4.	Find the DTFT of a discrete time signal $x(n) = a^{\lvert n \rvert};\ -1 < n < 1$
Option A:	$X(e^{jw}) = \frac{1-a^2}{1-2acos\omega+a^2}$
Option B:	$X(e^{jw}) = \frac{1+a^2}{1-2acos\omega+a^2}$
Option C:	$X(e^{jw}) = \frac{1-a}{1-2acos\omega+a^2}$
Option D:	$X(e^{jw}) = \frac{1-a^2}{1+a^2}$
Q5.	Find the inverse Z transform of,

	$$X(z)=\frac{1-z^{-1}+z^{-2}}{(1-\frac{1}{2}z^{-1})(1-2z^{-1})(1-z^{-1})}$$ For ROC $1<\|z\|<2$
Option A:	$x(n)=\left(\frac{1}{2}\right)^n u(n)-2(2)^n u(-n-1)-2u(n)$
Option B:	$x(n)=\left(\frac{1}{2}\right)^n u(n)-2(2)^n u(n)-2u(n)$
Option C:	$x(n)=\left(\frac{1}{2}\right)^n u(-n-1)-2(2)^n u(n)-2u(-n-1)$
Option D:	$x(n)=\left(\frac{1}{2}\right)^n u(-n-1)-2(2)^n u(-n-1)\,2u(-n-1)$
Q6.	What is the circular convolution of the sequences x1(n)={1,1,2,1} and x2(n)={1,2,3,4}?
Option A:	{13,14,11,13}
Option B:	{13,14,11,12}
Option C:	{13,11,14,12}
Option D:	{13,12,11,6}
Q7.	x(n)={1,1,0,0}.The DFT of the signal is
Option A:	{2,1+j,0,-j}
Option B:	{2,1-j,0,1+j}
Option C:	{2,1+j,0,1-j}
Option D:	{-2,1-j,0,1+j}
Q8.	IDFT of X(k)={1,0,1,0} is
Option A:	{0.5,0,-0.5,0}
Option B:	{0,0.5,0,0.5}
Option C:	{0.5,0,0,0.5}
Option D:	{0.5,0,0.5,0}
Q9.	Z transform of u(n-k) signal is
Option A:	U(Z)
Option B:	Z^{-k} U(Z)
Option C:	Z^{k} U(Z)
Option D:	Z U(Z)
Q10.	Find Linear convolution of the sequence if h(n)={1,2,2,1};x(n)={1,-1,1,-1}
Option A:	{1,1,1,0,-1,-1,-1}
Option B:	{1,-1,1,1,-1,-1,0}
Option C:	{1,0,1,0,1,0,1}
Option D:	{1,0,0,5,4,-1,-2}
Q11.	In radix-2 FFT algorithm, the value of N is
Option A:	2^m
Option B:	2m

Option C:	$2^{(1/m)}$
Option D:	2^{-m}
Q12.	The total number of complex additions required in radix-2 DIT-FFT algorithm is
Option A:	$N\ \log_2 N$
Option B:	$\frac{N}{\log_2 N}$
Option C:	$\frac{N}{2}\log_2 N$
Option D:	$\frac{N}{2}\log_2 \frac{N}{2}$
Q13.	In an N-point FFT algorithm, ______________________ memory locations are required to store the coefficients
Option A:	a. N-3
Option B:	c. N/3
Option C:	b. N^3
Option D:	d. 3N
Q14.	In an N-point sequence, if N=16, the total number of complex additions and multiplications using Radix-2 FFT are,
Option A:	64 and 80
Option B:	64 and 32
Option C:	80 and 64
Option D:	24 and 12
Q15.	DIF-FFT is
Option A:	Decimation in frequency FFT
Option B:	Decimation in time FFT
Option C:	Decade in frequency FFT
Option D:	Digital in frequency FFT
Q16.	The main lobe width of length M hamming window is
Option A:	.$\frac{4\pi}{M}$
Option B:	$\frac{8\pi}{M}$
Option C:	$\frac{7\pi}{M}$
Option D:	Variable
Q17.	The characteristics of ideal linear phase filter are,
Option A:	$\lvert H(e^{j\omega})\rvert = \frac{1}{\omega}$ and $\angle H(e^{j\omega}) = constant$
Option B:	$\lvert H(e^{j\omega})\rvert = -\alpha\omega$ and $\angle H(e^{j\omega}) = constant$
Option C:	$\lvert H(e^{j\omega})\rvert = constant$ and $\angle H(e^{j\omega}) = -\alpha\omega$
Option D:	$\lvert H(e^{j\omega})\rvert = constant$ and $\angle H(e^{j\omega}) = constant$
Q18.	Determine the co-efficient of a linear phase FIR filter of length N=15 which has a symmetric unit sample response and a frequency response that satisfies the

	condition $$H\left(\frac{2\pi k}{15}\right)=\begin{cases}1\,;for\ k=0,1,2,3\\ 0.4;for\ k=4\\ 0;for\ k=5,6,7\end{cases}$$ Calculate h(2) and h(12)
Option A:	0.062
Option B:	0.04
Option C:	0.004
Option D:	0.00843
Q19.	In type-1 frequency sampling technique of FIR filter designing the impulse response h(n) for M odd is
Option A:	$h(n)=\frac{1}{N}\left[H(0)+2\sum_{k=1}^{\frac{N-1}{2}}Re(H(k)e^{j2\pi nk/N})\right]$
Option B:	$h(n)=\frac{1}{N}\left[H(0)+2\sum_{k=1}^{\frac{N}{2}}Re(H(k)e^{j2\pi nk/N})\right]$
Option C:	$h(n)=\frac{1}{N}\left[H(0)+2\sum_{k=1}^{\frac{N-1}{2}}Re(H(k)e^{-j2\pi nk/N})\right]$
Option D:	$h(n)=\frac{1}{N}\left[H(0)+2\sum_{k=1}^{\frac{N}{2}-1}Re(H(k)e^{j2\pi nk/N})\right]$
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.	An analog filter transfer function is given by, $$H(s)=\frac{3}{s+1}$$ When the filter is transformed to digital filter using impulse invariant transformation, what are the poles and zeros of the filter?
Option A:	Zero at z=0, Pole at z=0.368
Option B:	Zero at z=1, Pole at z=0
Option C:	Zero at z=0.368,Pole at z=0
Option D:	Zero at z=0, pole at z=1
Q22.	In bilinear transformation the analog system with transfer function, $H(s)=\frac{0.3}{s+0.7}$ Is transformed to a digital system with transfer function,
Option A:	$$H(s)=\frac{-0.3}{1-e^{-0.7T}z^{-1}}$$
Option B:	$$H(s)=\frac{0.3}{1-e^{-0.7T}z^{-1}}$$

Option C:	$$H(s) = \frac{0.7}{1 - e^{-0.3T} z^{-1}}$$
Option D:	$$H(s) = \frac{0.7}{1 - e^{0.3T} z^{-1}}$$
Q23.	Consider the digital low pass butter worth filter with following specification $$0.9 \leq \lvert H(\omega) \rvert \leq 1.0\,; \quad 0 \leq \omega \leq 0.2\pi$$ $$\lvert H(\omega) \rvert \leq 0.1\,; 0.4\pi \leq \omega \leq \pi$$
Option A:	$N \geq 4$
Option B:	$N \geq 20$
Option C:	$N \geq 3$
Option D:	$N \geq 5$
Q24.	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:	Windowing method
Q25.	The pipelining refers to
Option A:	Prefetching instructions and storing in a FIFO queue
Option B:	Fetching instruction and data simultaneously
Option C:	Executing different phases of two or more instruction in parallel
Option D:	Executing different instruction in parallel using two or more computational units

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Question	**Correct Option** **(Enter either 'A' or 'B' or 'C' or 'D')**
Q1.	C
Q2.	C
Q3.	B
Q4	A
Q5	A
Q6	B
Q7	B
Q8.	D
Q9.	B
Q10.	A
Q11.	A
Q12.	A
Q13.	D
Q14.	B
Q15.	A
Q16.	A
Q17.	D

Q18.	B
Q19.	A
Q20.	D
Q21.	A
Q22.	B
Q23.	C
Q24.	B
Q25.	C