Time: 2 hour 30 minutes   Max. Marks: 80

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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Number of complex additions and complex multiplications in DFT are:
Option A:	$N(N-1)$ and N^2
Option B:	N^2 and N
Option C:	$N*\log(N)$ and $(N-1$
Option D:	N and N^2
2.	If sequence x[n] = {1, 2, 3, 4} have its DFT X[k] ={A, B, C, D} then x1[n] = {1, 4, 3,2} will have its DFT X1[k] equal to
Option A:	X1[k] = {A, D, C, B}
Option B:	X1[k] = {A, B, C, D}
Option C:	X1[k] = {A, D, B, C}
Option D:	X1[k] = {A, B, D, C}
3.	What is the lowest order of the Butterworth filter with a pass band gain KP=-1 dB at ΩP=4 rad/sec and stop band attenuation greater than or equal to 20dB at ΩS = 8 rad/sec?
Option A:	4
Option B:	5
Option C:	6
Option D:	3
4.	A 3 stage decimator is used to reduce the sampling rate from 3072 kHz to 48 kHz. What is the overall decimation factor?
Option A:	64
Option B:	32
Option C:	128
Option D:	256
5.	Antialiasing filter is required ….
Option A:	before down sampling
Option B:	before up sampling
Option C:	After down sampling
Option D:	After up sampling
6.	Impulse invariant method is suitable for the following type of digital filters
Option A:	Low pass filters
Option B:	High Pass filters

Option C:	Bandpass filters
Option D:	Bandstop filters
7.	The transfer function of an FIR linear phase is H(z)= 1+2z^{-1}+2 z^{-2}+z^{-3}. Classify the filter type.
Option A:	1
Option B:	2
Option C:	3
Option D:	4
8.	Find the digital transfer function H(z) by using impulse invariant method for the analog transfer function H(s)= 1/(s+2). Assume T=0.5 sec
Option A:	H(z)= 1/(1-e^(-1) z^(-1))
Option B:	H(z)= 1/(1-e^1 z^(-1))
Option C:	H(z)= 1/(1-e^(-1) z^1)
Option D:	H(z)= 1/(1-e^(-2) z^(-1))
9.	The steady state noise power due to input quantization is given by
Option A:	$\sigma_e^2 = \dfrac{2^{-b}}{12}$
Option B:	$\sigma_e^2 = \dfrac{2^{-2b}}{2}$
Option C:	$\sigma_e^2 = \dfrac{2^{-2b}}{12}$
Option D:	$\sigma_e^2 = \dfrac{2^{-4b}}{3}$
10.	Which processor is having 2 multipliers?
Option A:	TMS3201X
Option B:	TMS3203X
Option C:	TMS3205X
Option D:	TMS3206X

Q2. (20 Marks)	Solve any Four out of Six (5 marks each)
A	What is multirate processing? Where it is used? Explain in brief process of Interpolation and Decimation.
B	List various addressing modes of TMS320c67xx DSP processor
C	Give the properties of Twiddle Factor
D	What are overflow limit cycle oscillations?
E	What is Frequency wrapping?
F	Determine the frequency response of FIR filter defined by y[n] = 0.25x[n]+x[n-1]+0.25x[n-2].Calculate the phase delay and group delay.

Q3. (20 Marks)	Solve any Two Questions out of Three (10 marks each)
A	Find the DFT of the sequence x[n]= {1,2,3,4,4,3,2,1} using DIF FFT algorithm.
B	Find the order of Butterworth digital filter with following

	specifications: Stopband gain (As)=0.18 Passband gain (Ap) =0.89 Stopband frequency(ws)=0.6π rad/sample, Passband frequency(wp)=0.4 π rad/sample Sampling period is 1 second.
C	Explain the applications of DSP processor in speech signal processing

Q4. **(20 Marks)**	**Solve any Two Questions out of Three (10 marks each)**
A	*The output signal of an A/D converter is passed through a first order low pass filter with transfer function given by H(z)=$\frac{0.5z}{z-0.5}$. Find the steady state output noise from digital filter, when the input signal is quantized to have eight bits.*
B	*Perform the circular convolution of the following sequences x[n]= [1 1 2 1], h[n] = [1 2 3 -1] using DFT and IDFT method.*
C	*Using a rectangular window technique design a lowpass filter with passband gain of unity, cutoff frequency of 1000Hz and working at a sampling frequency of 5 KHz.The length of impulse response should be 7.*