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Supplementary Exam (Feb/Mar '24)

B.Tech Program: Electronics And Telecommunication
Examination: TY   Semester: V
Course Code: **EXC503**   and   Course Name: Discrete Time Signal Processing
Duration: 2.5 Hours   Max. Marks: 60

Instructions:
(1) All questions are compulsory.
(2) Draw neat diagrams wherever applicable.
(3) Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT Level
Q 1	**Solve any six questions out of eight:**	**12**		
i)	Determine Zeros of following FIR system & Indicate Whether following system is minimum phase, maximum phase or mixed phase system. $H(Z) = 1 - (5/2) Z^{-1} - (3/2) Z^{-2}$	02	CO1	Understand
ii)	Write the proof for time reversal property of DFT.	02	CO2	Understand
iii)	Write features of IIR filter	02	CO3	Understand
iv)	Write the equations of Hamming window and Rectangular window.	02	CO4	Understand
v)	State and explain quantization noise	02	CO5	Understand
vi)	Define sub band coding	02	CO6	Understand
vii)	$x(n) = \{8,10\}$ Find $X(k)$	02	CO2	Understand
viii)	Explain impulse invariant transformation	02	CO3	Understand
Q.2	**Solve any four questions out of six.**	**16**		
i)	A two pole low pass filter has the system function $H(Z) = \dfrac{b_0}{(1 - pZ^{-1})^2}$ Determine the values b_0 and p such that the frequency response $H(\omega)$ satisfies the condition $H(0) = 1$ and $\left| H\left(\dfrac{\pi}{4}\right) \right|^2 = \dfrac{1}{2}$	04	CO1	Evaluate

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ii)	Compute IDFT of $X(k)$= {8, 2-4j, 9, -2+2j} using FFT algorithms.	04	CO2	Understand
iii)	Obtain H(z) from H(s) when T= 1 sec and $H(s) = \frac{1}{s^2+2s+1}$, using Bilinear transformation	04	CO3	Evaluate
iv)	Draw structure of FIR band stop filter with the range of frequencies 2.5kHz to 3.8kHz by taking 5 samples	04	CO4	Understand
v)	Compare truncation and rounding method	04	CO5	Understand
vi)	Explain DTMF in brief.	04	CO6	Understand
Q.3	**Solve any two questions out of three.**	16		
i)	Draw direct form-I and form-II structure of the filter given below. $H(Z) = \frac{2+3Z^1+4Z^{-2}}{1-0.342Z^{-1}+5.897Z^{-2}}$	08	CO1	Create
ii)	Compute DFT of sequence, x (n) = {2,11,4,7,9,0,6,8}	08	CO3	Apply
iii)	Study second order IIR filter H(z)= $\frac{1}{(1-0.5z^{-1})(1-0.45z^{-1})}$ the shift in pole with 3-bits in direct form realization.	08	CO5	Evaluate
Q.4	**Solve any two questions out of three.**	16		
i)	Compute 8-point FFT of the sequence, x(n)= {1,6,-9,1,0,3,12,10} using DIT-FFT method	08	CO2	Evaluate
ii)	Design a linear phase FIR high pass filter using hamming window with cutoff frequency ωc = 0.12 π rad/samples by taking 07 samples.	08	CO4	Create
iii)	Explain application of DSP processor in ECG signal analysis with block diagram.	08	CO6	Evaluate