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Paper Id: 130508

Sub Code: REC503

 $2 \ge 7 = 14$

 $7 \times 3 = 2$



B TECH

(SEM V) THEORY EXAMINATION 2019-20 DIGITAL SIGNAL PROCESSING

Time: 3 Hours

Total Marks: 70

Notes:

• Attempt all Sections. Assume any missing data.

SECTION A

1. Attempt *all* questions in brief.

a.	Define linear convolution and its physical significance.
b.	What are advantages & disadvantages of window methods?
c.	What are the advantages of representing the digital system in block diagram form?
d.	Write the expression for Blackman and Bartlett window.
e.	If $x(n) = \{4,3,5,7,4,6\}$ & up sampling factor=3, then what will be the value of up
	sampler output.
f.	If $x(n) = \{1, 5, 2, 3\}$ what will be $x((3-n))_4$?
g.	Write down the advantages & disadvantages of bilinear transformation.

SECTION B

2. Attempt any *three* of the following:

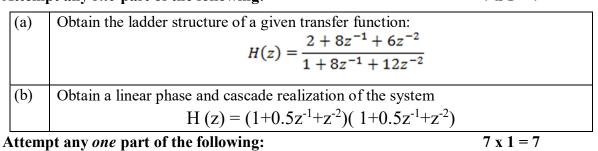
a.	Obtain the parallel form realization for the system function given below:
	$H(z) = \frac{(1+0.25z^{-1})}{(1+0.5z^{-1})(1+0.5z^{-1}+0.25z^{-2})}$
	$n(2) = (1+0.5z^{-1})(1+0.5z^{-1}+0.25z^{-2})$
b.	What the relation between DTFT and DFT. Explain the properties of DFT with
	examples.
c.	Explain the Gibbs phenomenon. Find the response of rectangular window and
	explain it.
d.	Find the 4-point circular convolution of $x(n)$ an $h(n)$ given by $x(n) = \{1,1,1,1\}$ &
	$h(n) = \{1,0,1,0\}$ using radix-2 DIF-FFT algorithm.
e.	The system function of analog filter is given by
	(s + 0.1)
	$H(s) = \frac{(s+0.1)}{(s+0.1)^2 + 16}$
	Obtain the system function of digital filter by using impulse invariant technique.
	Assume T=1sec.

SECTION C

3. Attempt any *one* part of the following:

4.

 $7 \ge 1 = 7$



mpt any one part of the following.

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r Id:	130508	Roll No											
(a)	Design a Butt	erworth low pass and	alog	filter	for t	he fo	llow	ing	spe	cifica	tion:		
	(i) Pass band gain required:0.9												
		equency up to which	pass	band	l gai	n mu	st re	emai	n m	ore o	r less	stea	ıdy
		00 rad/sec ain in attenuation ba	0.1.0	4									
		equency from which			atio	n mu	st st	art	200	rad/s	ec		
(b)		uency warping effe										oilin	ea
		ethod of IIR filter											
	U	s of bilinear transform	natio	n.									
Attem	pt any <i>one</i> par	t of the following:								7 x	1 = 7		
(a)		nas following symmetries frequency respon									[-1-n)) for	N
(b)		pas discrete time filt							_				
		$0.99 \leq \mathrm{H}(e^{j\omega}) $	≤ 1.0	1			ω	≤ 0.	.4π				
		$\left \mathrm{H}\left(e^{j\omega} \right) \right \leq 0.0$	l			(0.6π	≤ 0	ω :	$\leq \pi$			
	Use Kaiser W	indow for design.											
Attem		t of the following:								7 x	1 = 7		
(a)	Find the 8-pir	t DFT of $x(n)=2^n b$	y usi	ng D	IT F	FT a	lgor	ithm	ı.				
(b)		ultiplication of DFT								nt to	the c	circu	ıla
		f the two sequences	in tir	ne do	mair	1.						0	
Attem	<u> </u>	t of the following:	V								1=7	<u> </u>	
(a)	Write a short	note on (i) Sub-ban	1			1		n1 (ii) ()11adr	ature	mir	mo
	filter.										D .		IC
(b)	filter.										D .		
(b)	filter.	G									D .		