Hall Ticket Number :										

Code : 1G372 **R-11**

IV B.Tech. I Semester Supplementary Examinations May 2016

Digital Signal Processing

(Common to EEE & ECE)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. a) Investigate the causality and stability of the following systems.
i) $h(n)=(2)^n u(n-1)$; **ii)** $h(n)=(0.5)^{|n|}$ 6M

   b) Compute the convolution sum $y(n)=x(n)*h(n)$

   Where $x(n)=\left(\frac{1}{2}\right)^n u(n)$ and $h(n)=¢(n)-\frac{1}{2}¢(n-1)$. 8M

2. a) If $F[x(n)]=X(e^{jw})$ then, prove that $F[nx(n)]=j\frac{d}{dw}X(e^{jw})$. 7M

   b) The first five points of the 8-point DFT of real valued sequence are {0.25, 0.5-j0.5, 0, 0.5-j0.86, 0}. Find the remaining three points. 7M

3. a) Find the 8–point DFT of real sequence x(n)={1,1,1,1,0,0,0,0} by using DIF-FFT algorithm. 10M

   b) What is in-place algorithm and what is the advantage of this algorithm? 4M

4. a) Obtain the parallel realization for the transfer function H(z) given below

$$H(Z)=\frac{8z^3-4z^2+11z-2}{(z-\frac{1}{4})(z^2-z+\frac{1}{2})}.$$ 7M

   b) Realize the linear phase FIR filter having the following impulse response.

$$h(n)=¢(n)+\frac{1}{4}¢(n-1)-\frac{1}{8}¢(n-2)+\frac{1}{4}¢(n-3)+¢(n-4).$$ 7M

5. Given $H_a(s)=\frac{16(s+2)}{(s^2+2s+5)(s+3)}$. Find H(z) using impulse invariant transformation. Assume T=0.2 sec. 14M

6. A low pass filter has the desired frequency response

$$w_R(e^{jw})=H_d(w)=\begin{cases}e^{-j3w}, & 0<|w|<\frac{®}{2}\\ 0, & \frac{®}{2}<|w|<®\end{cases}.$$

   Determine h(n) based on frequency sampling technique. Take N=7. 14M

7. a) Show that the up-sampler and down-sampler satisfy the property of commutation if they are co-prime. 7M

   b) Explain the ploy phase decomposition of an IIR filter with example. 7M

8. Write short notes on spectral transformations. 14M

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