Hall Ticket Number :										

R-11 / R-13

Code: 1G372

IV B.Tech. I Semester Supplementary Examinations November 2019

Digital Signal Processing

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer any **five** questions

All Questions carry equal marks (**14 Marks** each)

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1. a) State and Prove the following properties of the discrete time Fourier transform
   (i) Time shifting (ii) Time Convolution 7M
   b) Determine the values of power and energy of the following signals. Find whether the signals are power, energy or neither energy nor power signal $X(n)=(1/3)^n u(n)$ 7M
2. a) State and prove the following properties of discrete Fourier series
   (i) Linearity (ii) Time reversal 7M
   b) Compute the discrete Fourier transform of the sequence x(n) = {1,1,1,1} 7M
3. What is the need of FFT? Explain 16-point radix-2 DIT-FFT algorithm with the help of flow-graph and necessary steps 14M
4. A causal system is represented by the following difference equation
   $y(n) + (1/4)\, y(n-1) = x(n) + (1/2)\, x(n-1)$
   (a) Find the system function H(z) and give the corresponding ROC
   (b) Find the unit step response of the system in analytical form
   (c) Determine the frequency response $H(e^{j\omega})$ and also find magnitude and phase response 14M
5. a) Compare an analog lowpass Butterworth and Chebyshev filters 7M
   b) List out the merits and demerits of the digital filters over analog filters 7M
6. Design a digital FIR filter with
   $H_d(e^{j\omega}) = e^{-j\omega 3}$; $-\pi/4 \le \omega \le \pi/4$
   $= 0$; $\pi/4 \le |\omega| \le \pi$
   Using a Hamming window with N=7 14M
7. a) List out the applications of multirate signal processing 7M
   b) Consider a signal x(n) = u(n)
   (i) Determine and sketch a signal with a decimation factor '3'
   (ii) Determine and sketch a signal with a interpolation factor '3' 7M
8. Discuss the need of signal compression 14M

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