PVP 12

Code: EC6T4, EM6T1, EE6T6

III B.Tech - II Semester – Regular Examinations - May 2015

DIGITAL SIGNAL PROCESSING
(Common for ECE, ECM, EEE)

Duration: 3 hours Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1 a) Determine whether the following systems are linear, causal, time-invariant and stable. 6 M

(i) $y(n) = x(n) \cos(x(n))$

(ii) $y(n) = x(n) + n\,x(n+1)$.

b) Suppose an LTI system with input $x(n)$ and output $y(n)$ is characterized by its unit sample response $h(n) = (0.8)^n u(n)$. Find the response $y(n)$ of such a system to the input signal $x(n)\,u(n)$. 8 M

2 a) Obtain the parallel form and cascade form for the system described by a difference equation 8 M

$$y(n)=\frac{5}{6}y(n-1)-\frac{1}{6}y(n-2)+x(n)-\frac{1}{2}x(n-1).$$

b) Determine the pole and zero plot for the system described by the difference equation 6 M

$y(n) = x(n) + 2x(n-1) - 4x(n-2) + x(n-3)$.

3 a) Find the convolution sum of x(n) =1, n = -2, 0, 1
= 2, n= -1
= 0, elsewhere
and h(n) = δ (n) – δ (n-1) + δ(n-2) - δ (n-3). 10 M

b) State and prove any two properties of DFT. 4 M

4 a) Compute the eight –point DFT for the sequence x(n)= {0.5, 0.5, 0.5, 0.5, 0, 0, 0, 0} using Radix-2 DIT algorithm. 8 M

b) Discuss the use of FFT algorithm in linear filtering. 6 M

5 a) Derive bilinear transformation for an analog filter with system function H(s) = b/ s + a 7 M

b) For the analog transfer function H(s) = 2 / (s+1) (s+3), determine H (z) using bilinear transformation with T=0.1 sec. 7 M

6 a) Design a HPF of length 7 with cut off frequency of 2 rad/sec using Hamming window. Plot the magnitude and phase response. 8 M

b) Explain the principle and procedure for designing FIR filter using rectangular window. 6 M

7 a) With the help of equation, explain sampling rate conversion by a rational factor I/D. 6 M

b) Explain the concept of decimation by a factor D and obtain necessary equations. 8 M

8 a) Explain the application of speech compression. 8 M

b) Write short notes on speech vocoders and subband coding. 6 M