

III B.Tech(CCC) Supplementary Examinations, May/Jun 2007
DIGITAL SIGNAL PROCESSING
 (Electronics & Communication Engineering)

Time: 3 hours

Max Marks:100

Answer any FIVE Questions
 All Questions carry equal marks

1. (a) Verify whether the following sequence is periodic or not, if periodic find the fundamental period.
 - i. $x(n) = e^{j(n/8-\pi)}$
 - ii. $x(n) = \cos(\pi n^2/8)$
 (b) Show that an LSI system can be described by its unit sample response. [12+8]
2. (a) Explain how the analysis of discrete time invariant system can be obtained using convolution properties of Z transform.
 (b) Determine the impulse response of the system described by the difference equation $y(n)-3y(n-1)-4y(n-2)=x(n)+2x(n-1)$ using Z transform. [10+10]
3. (a) Prove that the convolution in time domain leads to multiplication in frequency domain for discrete time signals
 (b) The output $y(n)$ for a linear shift invariant system, with the input $x(n)$ is given by
 $Y(n) = x(n)-2x(n-1)+x(n-2)$
 Compute and sketch the magnitude and phase response of the system $|w| \leq \pi$
 [10+10]
4. (a) Prove the following properties.
 - i. $x^*(n) \rightarrow X^*((-K))_N R_N(K)$
 - ii. $x^*((-n))_N R_N(n) \rightarrow X_{ep}(k) = 1/2[X((K))_N + X^*((-K))_N] R_N(K)$
 (b) Let $X(K)$ denotes the N-point DFT of the N-point sequence $x(n)$ show that if $x(n)$ satisfies the relation $x(n) = -x(N-1-n)$ then $X(0) = 0$. [10+10]
5. An 8 point sequence is given by $x(n) = \{2,2,2,2,1,1,1,1\}$. Compute 8 point DFT of $x(n)$ by
 - (a) radix - 2 DIT FFT
 - (b) radix - 2 DIF FFT
 Also sketch magnitude and phase spectrum. [20]
6. (a) What is warping effect? Discuss influence of warping effect on amplitude response and phase response of a derived digital filter from a corresponding analog filter.
 (b) Discuss impulse invariance method. [10+10]

7. (a) Define Infinite Impulse Response & Finite Impulse Response filters and compare.
- (b) Design a low pass Finite Impulse Response filter with a rectangular window for a five stage filter given:
Sampling time 1 msec; $f_c = 200Hz$
Draw the filter structure with minimum number of multipliers. [8+12]
8. (a) Explain the factors that influence the choice of structure for realisation of a LTI system.
- (b) An LTI system is described by the difference equation $y(n) = a_1y(n-1) + x(n) + b_1x(n-1)$
Realize it in direct form I structure and convert it to direct form II structure. [6+14]
