

IV B.Tech II Semester Regular Examinations, April/May 2005
DIGITAL SIGNAL PROCESSING
 (Common to Electronics & Instrumentation Engineering and Electronics &
 Control Engineering)

Time: 3 hours**Max Marks: 70**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Derive an expression for transfer function of an LTI system.
 (b) Check whether the given systems are linear, time-invariant, causal, and stable.
 - i. $y(n) = |x(n)|$
 - ii. $y(n) = \text{sgn} [x(n)]$.
2. (a) State and prove symmetry properties of DFS.
 (b) Determine DFT of given sequence using DIF FFT algorithm: $x(n) = 1, 1, 1, 1, 2, 2, 2, 2$.
3. (a) State and prove duality and circular convolution properties of DFT.
 (b) Compare the circular convolution of $x(n) = 1, 3, 5, 3$, $h(n) = 2, 3, 1, 1$
4. (a) A difference equation describing a filter is given below. $y(n) - \frac{3}{4}y(n-1) + \frac{1}{8}y(n-2) = x(n) + \frac{1}{2}x(n-1)$ Test whether the given system is stable or not using jurys Test.
 (b) Verity the above result using Z-transform method.
5. (a) Compare and contrast FIR and IIR filters.
 (b) Design an analog butter worth filter to meet the given specifications.
 - i. pass band gain of 2dB upto 10 KHZ.
 - ii. Stop band alternation of 20dB beyond 100KHZ.
6. (a) Derive an expression for bilinear transformation method.
 (b) If $H_a(s) = \frac{1}{(s+1)(s+2)}$, find the corresponding $H(z)$ using impulse invariance method for sampling frequency of 5 samples/sec.
7. (a) Design a highpass FIR filter having cutoff frequency $W_C = 2\text{rad/sec}$ and length of 7, using hamming window.
 (b) Write short notes on windowing technique.
8. Answer any TWO of the following:
 - (a) Gibbs phenomenon
 - (b) Application of FET in filtering
 - (c) In-place computation.
