NR

Code No: A3804

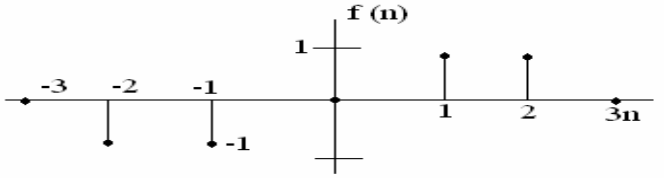
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I Semester Examinations March/April-2011
DETECTION AND ESTIMATION OF SIGNALS
(DIGITAL ELECTRONICS AND COMMUNICATION SYSTEMS)

Time: 3hours **Max.Marks:60**

Answer any five questions
All questions carry equal marks

\- - -

1.a) Find the discrete fourier transform of the function shown in figure.



b) A filter with input x_n and output y_n is defined by $y_n = x_n + 2x_{n-1} + x_{n-2}$. Find the transfer function of this filter and sketch |H(W)| & $\angle$H(W) assuming $T_S = 10^{-3} S$. [12]

2. The output spectral density of a recursive filter is

$$S_y(w) = \frac{b^2\sigma_n^2}{(1+a^2) - 2a\cos wT_s}$$

Show that this $S_y(w)$ is the transform of the autocorrelation function

$$R_y(k) = \frac{\sigma_n^2 b^2}{1-a^2} a^{-|k|}$$ [12]

3.a) Explain how the power spectral density describe the average rates of fluctuation of the random signal?

b) Explain how the band limited random signal can be reconstructed from its samples. [12]

4. Explain the optimum detection algorithms in detail with suitable examples. [12]

5.a) Explain how to find a matched filter coefficients.

b) Discuss the optimum processing for the detection of an arbitrary known signal in the presence of noise. [12]

6. Explain the mean – squared estimation in statistical sense with example. [12]

7.a) Explain the recursive estimation technique for random signals.

b) What are the various applications of kalman filter? [12]

8. Write a short notes on
   i) ML estimator.
   ii) Maximum likelihood estimate of parameters. [12]

* * * * *