(DEC 323)

B.Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the End of Third Year)

Electronics & Communications

Paper - III : DIGITAL SIGNAL PROCESSING

Time : 3 Hours **Maximum Marks : 75**

Answer question No.1 compulsory ***(15 × 1 = 15)***

Answer ONE question from each unit ***(4 × 15 = 60)***

1) a) Define causal and Non-causal signals.

b) What is a linear system state its condition.

c) What is the relation between Fourier Transform and Z-transform.

d) Define one-sided and two-sided Z-transform.

e) State the initial value theorem with regard to Z- transform.

f) What is FFT?

g) Define inverse DFT.

h) State the shifting property of DFT.

i) Define an IIR filter.

j) Write the magnitude function of chebyshex lowpass filter.

k) What is Butterworth approximation.

l) Write the equation for Blackman window.

m) Give advantages of FIR filters.

n) What is aliasing.

o) What is the necessary condition for Linear phase realization of FIR systems.

UNIT – I

2) a) Explain the concept of digital signal processing.

b) State and prove following properties of Z-transform.

i) Time reversal

ii) Differentiation in Z-domain

OR

3) a) Prove that conxolution in time domain leads to multiplication in frequency domain for discrete time signals.

b) Determine Z-transform and ROC for $-a^n u(-n-1)$

UNIT - II

4) a) Determine DFT of a sequence $x(n) = \{1, 1, 0, 0\}$

b) Obtain the relation between Z-transform and DFS.

OR

5) a) What is FFT? Calculate the number of multiplications needed in the calculation of DFT with 32 point sequence.

b) Compute circular convolution using DIT-FFT algorithm for the given sequences $x(n) = \{1, 1, 1, 1\}$ and $h(n) = \{1, 0, 1, 0\}$.

UNIT - III

6) a) Describe IIR filter characterization in time domain.

b) Discuss magnitude characteristics of an analog Butterworth filter and give its pole locations.

OR

7) a) Convert the following analog filter transfer function into digital filter transfer function using backward difference method. $H(S)=\frac{1}{(S+2)^2+9}$

b) Design an analog Butterworth filter that has a – 2dB pass band attenuation at a frequency of 20rad/sec and atleast – 10dB stop band attenuation at 30rad/sec.
(Assume $\Omega_C = 21.3868$ rad/sec)

UNIT - IV

8) a) Compare the frequency domain characteristics of different windows used in FIR filter design.

b) Give the expression for rectangular window function. Find its frequency response and also sketch its spectrum.

OR

9) a) What are the advantages of FIR filters over IIR filters.

b) Obtain the parallel form of realization of LTI system governed by the equation.

$$y(n) = -\frac{3}{8}y(n-1) + \frac{3}{32}y(n-2) + \frac{1}{64}y(n-3) + x(n) + 3x(n-1) + 2x(n-2)$$

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