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Reg. No. : .....

Name : .....

Seventh Semester B.Tech. Degree Examination, April 2015
(2008 Scheme)
Branch : Electrical and Electronics Engg.
08.703 : DIGITAL SIGNAL PROCESSING

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **4** marks :

1. Explain various types of signals.
2. What are energy and Power Signals ?
3. Show that the discrete time system described by the input – output relationship y[n] = nx[n] is linear.
4. Find the even and odd part of the signals ; (a) x(n) = u(n), (b) $x(n) = \alpha^n u(n)$.
5. Show that if, $X(e^{j\omega})$ is real and even, x(n) is real and even using DTFT properties.
6. List four properties of Z-Transform.
7. Find the Z-transform of the function, $x(n) = ne^{-an}$ where a is real.
8. How circular convolution is performed using DFT ?
9. How the discrete time systems are implemented ?
10. Consider the causal shift invariant filter with system function $H(z) = \frac{1+0.875z^{-1}}{(1+0.2z^{-1}+0.9z^{-2})(1-0.7z^{-1})}$. Draw the signal flow graph for this system using direct form I.

(10×4=40 Marks)

P.T.O.

PART – B

Answer **one** question from **each Module** :

Module – I

11. a) With the help of a flow chart, explain DSP system concept.

    b) A linear system is one that is both homogeneous and additive.

    i) Give an example of a system that is homogeneous but not additive,

    ii) Give an example of a system that is additive but not homogeneous. **20**

OR

12. a) State the conditions for existence of FT.

    b) Explain the following

    i) Causal system

    ii) Linear system

    iii) LTI system.

    c) Test the given system is stable or not

    a) $h_1(n) = 2^n u(n-3)$,

    b) $h_2(n) = e^{n/2} u(n-4)$. **20**

Module – II

13. a) State and prove any five properties of Z-transform.

    b) Determine the Z-transform of given function $G(s) = \frac{s+1}{s(s^2+s+1)}$. **20**

OR

14. a) Determine the value of x(n) for the given $X(z) = \frac{z(1-e^{-Y})}{(z-1)(z-e^{-T})}$ using Residue method.

    b) Derive the expression for eight point Radix-2 DIT FFT algorithms and draw butterfly diagram. **20**

Module – III

15. a) The unit sample response of an FIR filter is

$$h(n) = \begin{cases} \alpha^n & 0 \le n \le 6 \\ 0 & \text{otherwise} \end{cases}$$

i) Draw the direct form implementation of this system.

ii) Show that the corresponding system function is $H(z) = \frac{1-\alpha^7 z^{-7}}{1-\alpha z^{-1}}$ $|z| > 0$.

b) Implement a discrete time system using IIR system in direct form. **20**

OR

16. Design a digital Butterworth filter satisfying the constraints :

$$0.707 \le \left|H\left(e^{j\omega}\right)\right| \le 1 \text{ for } 0 \le \omega \le \frac{\pi}{2}$$

$$\left|H\left(e^{j\omega}\right)\right| \le 0.2 \text{ for } \frac{3\pi}{4} \le \omega \le \pi$$

With T = 1 sec. using (a) The bilinear Transformation, (b) Impulse invariance. **20**