Roll No. | | | | | | | | | | | | | Total No. of Pages :02

Total No. of Questions : 09

B.Tech.(EE)(2011 Onwards Elective-II) (Sem.–7,8)

DIGITAL SIGNAL PROCESSING

Subject Code : BTEE-804C

M.Code : 71938

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a. Differentiate continuous time and discrete time signals.

b. Differentiate between causal and noncausal systems.

c. What do you mean by periodic and aperiodic signals? Explain.

d. What do you mean by cross-correlation? Explain.

e. Discuss the differentiation property of z transform and comment upon the ROC.

f. Explain unit step and unit ramp signals.

g. What do you mean by frequency analysis? Explain.

h. What do you mean by LTI system? Explain.

i. Draw the magnitude characteristics of physically realizable filters and mark the different frequencies and bands.

j. Compare IIR and FIR filters.

SECTION-B

2. Consider the system $y(n) = T[x(n)] = x(n^2)$

   a. Determine if the system is time invariant?

   b. Determine if the system is linear?

3. Find the Z-transform of $x(n) = a^n u(n) + b^n u(-n-1)$

4. Determine the Fourier Transform of the signal.

$$x(n) = a^{|n|}, \quad -1 < a < 1$$

5. Discuss the concept of frequency in continuous and discrete time signals.

6. Discuss the use of DFT in linear filtering.

SECTION-C

7. Compute the 8-point DFT of the sequence.

$$x(n) = \begin{cases} 5n+3, & 0 \le n \le 7 \\ 0, & otherwise \end{cases}$$

8. Convert the analog filter with system function $H(s) = \frac{s+0.1}{(s+0.1)^2+16}$ into a digital IIR filter by means of the bilinear transformation. The digital filter is to have a resonant frequency of $\frac{\pi}{2}$.

9. Discuss the following :

   a. Basic elements and advantages of DSP systems.

   b. Frequency analysis of continuous time signals.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.