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Total No. of Pages :02

Total No. of Questions : 09

B.Tech.(EE)(2019 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.

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

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.