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Total No. of Printed Pages: 1

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B. Tech (ECE) (Semester – 7th)
DIGITAL SIGNAL PROCESSING
Subject Code: BECE1729
Paper ID: [111331]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a. Write two advantages of digital over analog signal processing.
- b. What is the importance of windowing?
- c. Differentiate between linear and non-linear systems.
- d. What are the advantages of representing the digital filter in the block diagram form?
- e. State the final value theorem of z-transform.
- f. What do you mean by time shifting of discrete time signals?
- g. Explain causal and non-causal LTI systems. Give examples of each.
- h. Differentiate between energy and power signals with the help of example.
- i. State Gibb's phenomenon.
- j. How the stability of the linear time invariant system is calculated?

Section – B

(5 marks each)

- Q2. What are the advantages of FIR filters over IIR filters?
- Q3. Discuss the advantages and disadvantages of digital signal processing over analog signal processing.
- Q4. Obtain inverse Z-transform using partial fraction expansion method where:
- $$X(z) = \frac{1}{(z-1)(z-3)}$$
- Q5. Determine the convolution of $h(n)$ and $x(n)$:
- $h(n) = \{1, 2, 1, -1\}$ & $x(n) = \{1, 2, 3, 1\}$
- Q6. Discuss FFT algorithm using decimation in time technique.

Section – C

(10 marks each)

- Q7. (a) Derive the relationship between impulse response and frequency response of a discrete time system.
- (b) Write a short note on band pass and band stop filters.
- Q8. Find the inverse DFT of $X(k) = \{1, 2, 3, 4\}$.
- Q9. (a) What is the physical significance of ROC in z-transform?
- (b) Show that for LTI discrete-time system to be stable, all the poles should lie within the unit circle.