

CBCS SCHEME

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17EC52

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Digital Signal Processing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Show that finite duration sequence of length L can be reconstructed from the equidistant N samples of its Fourier transform, where $N \geq L$. (06 Marks)
- b. Compute the 6-point DFT of the sequence $x(n) = \{1, 0, 3, -1, 3, 0\}$. (08 Marks)
- c. Find the N -point DFT of the sequence $x(n) = a^n$, $0 \leq n \leq N-1$. (06 Marks)

OR

- 2 a. Determine the 6-point sequence $x(n)$ having the DFT $X(K) = \{12, -3 - j\sqrt{3}, 0, 0, 0, -3 + j\sqrt{3}\}$. (08 Marks)
- b. Derive the equation to express z -transform of a finite duration sequence in terms of its N -point DFT. (06 Marks)
- c. Compute the circular convolution of the sequences $x_1(n) = \{1, 2, 2, 1\}$ and $x_2(n) = \{-1, -2, -2, -1\}$. (06 Marks)

Module-2

- 3 a. State and prove the modulation property (multiplication in time-domain) of DFT. (06 Marks)
- b. The even samples of an eleven-point DFT of a real sequence are : $X(0) = 8$, $X(2) = -2 + j3$, $X(4) = 3 - j5$, $X(6) = 4 + j7$, $X(8) = 5 - j9$ and $X(10) = \sqrt{3} - j2$. Determine the odd samples of the DFT. (06 Marks)
- c. An LTI system has impulse response $h(n) = \{2, 1, -1\}$. Determine the output of the system for the input $x(n) = \{1, 2, 3, 3, 2, 1\}$ using circular convolution method. (08 Marks)

OR

- 4 a. State and prove circular time reversal property of DFT. (06 Marks)
- b. Determine the number of real multiplications, real additions, and trigonometric functions required to compute the 8-point DFT using direct method. (04 Marks)
- c. Find the output $y(n)$ of a filter whose impulse response is $h(n) = \{1, 2, 1\}$, and the input is $x(n) = \{1, 2, 0, 1, 3, 2, 0, 1, 2, 1\}$ using overlap-add method, taking $N = 6$. (10 Marks)

Module-3

- 5 a. Compute the 8-point DFT of the sequence $x(n) = \cos(\pi n/4)$, $0 \leq n \leq 7$, using DFT-FFT algorithm. (10 Marks)
- b. Given $x(n) = \{1, 2, 3, 4\}$, compute the DFT sample $X(3)$ using Goestzel algorithm. (06 Marks)
- c. Determine the number of complex multiplications and complex additions required to compute 64-point DFT using radix-2 FFT algorithm. (04 Marks)

1 of 2

Important Note: 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any involving of identification, appeal to evaluate and/or equations written eg. Q-8-9), will be treated as malpractice.

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R. Natarajan



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Digital Signal Processing C. Ramesh Babu Durai, 2005-12 **Proceedings of the International Conference on Transformations in Engineering Education** R. Natarajan, 2014-10-22 This book comprises the proceedings of the International Conference on Transformations in Engineering Education conducted jointly by BVB College of Engineering Technology Hubli India and Indo US Collaboration for Engineering Education IUCEE This event is done in collaboration with International Federation of Engineering Education Societies IFEES American Society for Engineering Education ASEE and Global Engineering Deans Council GEDC The conference is about showcasing the transformational practices in Engineering Education space

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