

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-8-50, will be treated as malpractice.

Digital Signal Processing Question Paper

Tobias Bleicker



Digital Signal Processing Question Paper:

Digital Signal Processing Muhammad Khan, Syed K. Hasnain, Mohsin Jamil, 2022-09-01 The subject of Digital Signal Processing DSP is enormously complex involving many concepts probabilities and signal processing that are woven together in an intricate manner To cope with this scope and complexity many DSP texts are often organized around the numerical examples of a communication system With such organization readers can see through the complexity of DSP they learn about the distinct concepts and protocols in one part of the communication system while seeing the big picture of how all parts fit together From a pedagogical perspective our personal experience has been that such approach indeed works well Based on the authors extensive experience in teaching and research Digital Signal Processing a breadth first approach is written with the reader in mind The book is intended for a course on digital signal processing for seniors and undergraduate students The subject has high popularity in the field of electrical and computer engineering and the authors consider all the needs and tools used in analysis and design of discrete time systems for signal processing Key features of the book include The extensive use of MATLAB based examples to illustrate how to solve signal processing problems The textbook includes a wealth of problems with solutions Worked out examples have been included to explain new and difficult concepts which help to expose the reader to real life signal processing problems The inclusion of FIR and IIR filter design further enrich the contents

Digital Signal Processing Applications, 1998 **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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Proceedings of the IEEE 1984 National Aerospace and Electronics Conference, NAECON 1984, 1984 *UKACC International Conference on Control '96, 2-5 September 1996, Venue, University of Exeter, UK*, 1996 **ICASSP 90: Digital signal processing**, 1990 *IEEE Digital Signal Processing Workshop*, 1994 *Proceedings of IEEE Sensors ...*, 2002 **2001 International Symposium on VLSI Technology, Systems, and Applications** IEEE, Taipei Section Staff, 2001 **First International Conference on Integrated Optical Circuit Engineering** S. Sriram, D. B. Ostrowsky, 1985 *Conference Proceedings*, 1984 **IEEE Proceedings of the Southeastcon**, 1984 **1987 IEEE International Symposium on Circuits and Systems**, 1987

The Publishers' Trade List Annual ,1984 Proceedings of the National Communications Forum ,1986 *Journal of the Audio Engineering Society* Audio Engineering Society,1980 Some issues include Directory of members **Proceedings of the Fourth IEEE Symposium on Parallel and Distributed Processing** ,1992 WESCON ... Conference Record ,1980 Alta frequenza ,1986

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