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MANIPAL INSTITUTE OF TECHNOLOGY Manipal University



## SIXTH SEMESTER B.TECH (E & C) DEGREE END SEMESTER EXAMINATION MAY/JUNE 2016 SUBJECT: ADVANCED DIGITAL SIGNAL PROCESSING (ECE - 328)

## TIME: 3 HOURS

Instructions to candidates

MAX. MARKS: 50

- Answer **ANY FIVE** full questions.
- Missing data may be suitably assumed.
- 1A. Discuss the working of trans-multiplexer used in digital telephone networks. Explain the benefits of multirate system used in this system?
- 1B. Derive the frequency domain representation of decimation operation using the fundamentals of multirate systems.
- 1C. An audio system requires sampling rate conversion from a 36.75 KHz to 44.1 KHz. Design a multirate system to achieve this conversion. Calculate the cutoff frequency of the filter to be used in this system.

(5+3+2)

- 2A. Draw a uniform DFT filter bank and prove that it is equivalent to analysis filter bank. Derive its equivalent polyphase structure. How an efficient structure can be developed using noble identities?
- 2B. What are doubly complimentary filters? Explain its use in digital audio.
- 2C. Draw the polyphase implementation of tunable filters and explain its working.

(5+3+2)

- 3A. Derive the filter bank implementation of Short Time Fourier Transform. Draw the spectra. What are its advantages over Fourier transform
- 3B. Discuss the choice of window and time-frequency trade-off in Short Time Fourier Transform. Propose a scheme to overcome this limitation.
- 3C. Show the 4-channel implementation of Discrete Wavelet Transformation using filter banks.

(5+3+2)

- 4A. List the advantages of adaptive filters. Derive the steepest descent algorithm used to update the weights in an adaptive Wiener filter.
- 4B. Draw the adaptive noise canceller model. Explain its working.
- 4C. What are the applications of an adaptive linear combiner?

(5+3+2)

- 5A. Explain the principle of RLS algorithm. Compare its performance with LMS algorithm.
- 5B. Draw the adaptive echo canceller model and explain its working.
- 5C. Discuss the role of correlation canceller loop in adaptive filtering.

(5+3+2)

- 6A. What is Homomorphic signal processing? Explain its use in contrast enhancement and dynamic range compression of digital images.
- 6B. Draw the discrete time model of speech production system and explain its working.
- 6C. What are the applications of Homomorphic deconvolution?

(5+3+2)