

ID. No. 24422

B.Tech. 7th Semester F-Scheme (AEIE/EE)

Examination, May-2014

DIGITAL SIGNAL PROCESSING

Paper-ECE-409 F

Time allowed : 3 hours] [Maximum marks : 100

Note : (i) Q. No. 1 is compulsory and attempt one question from each sections.

(ii) Students will have to attempt five questions out of nine questions.

1. (a) What is the Role of Analog-to-digital converter in a Digital Signal Processing System ? 5
- (b) What do you understand by Symmetric FIR filters ? 5
- (c) Write the advantages of representing in digital filter in the block diagram form. 5
- (d) What is the need for Multirate Digital System ? 5

Section-A

2. (a) Determine the current value of output $y(n)$ of a discrete time LTI system which is described by

$$y(n) = x(n) + \frac{1}{3} y(n-1) \quad 10$$

- (b) Discuss the various properties of DTFT. 10

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3. What are the different types of structures for IIR System realization ? 20

Section-B

4. Determine the z-transform of the following discrete time signals. Also find the ROC for the following cases.

$$x(n) = 3 \left(-\frac{1}{2} \right)^n u(n) - 2(3)^n u(-n-1) \quad 20$$

5. Write short notes on :

- (i) Freq. domain representation of sampling
- (ii) Changing the sampling rate using discrete time processing. 20

Section-C

6. Draw the cascade and parallel realisations for the following system function.

$$H(z) = \frac{1 + \frac{1}{4}z^{-1}}{\left(1 + \frac{1}{2}z^{-1}\right)\left(1 + \frac{1}{2}z^{-1} + \frac{1}{4}z^{-2}\right)} \quad 20$$

7. Discuss the design technique of digital filters :

(i) Window Technique for FIR

(ii) Bi-linear transformation for IIR. 20

Section-D

8. Obtain the polyphase structure of the filters with the filter transfer function

$$H(z) = \frac{1 + 3z^{-1}}{1 + 4z^{-1}} \quad 20$$

9. Write short note on : 20

(i) MDSP

(ii) Decimation filter

(iii) Digital filter banks.