Roll No. .....

OLE-24422

B. Tech 7th Semester (EE) Examination – April, 2021

DIGITAL SIGNAL PROCESSING

Paper : ECE-409-F

Time : Three Hours] ***[Maximum Marks : 100***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. **1** is ***compulsory***. Students have to attempt ***one*** question form each Section.

1. (a) What are the basic elements of Digital signal Processing ?

(b) Define :

(i) Energy & Power signals

(ii) Periodic & Aperiodic signals

(iii) Even & odd signals

(c) How sampling rate can be converted using Rational factor I/D ?

(d) Determine the inverse Z-transform of : $5 \times 4 = 20$

$$X(z) = \frac{1}{1 - 1.5z^{-1} + 0.5z^{-2}}$$

SECTION – A

2. (a) How classification of the signals involved in applications is done ? 10

(b) Write & explain various steps involved in Analog to Digital Conversion. 10

3. (a) Classify the Discrete-Time-systems according to their general properties. 10

(b) Write about Recursive and Nonrecursive Realizations of FIR systems. 10

SECTION – B

4. (a) Explain Sampling Theorem. 10

(b) Explain with diagram the confugration of a general system used to achieve Discrete-Time-Processing of continuous-Time-signals. 10

5. (a) Prove the final value theorem for the one-sided z-transform. 10

(b) Prove the convolution and correlation properties of z-transform using only its defination. 10

SECTION – C

6. (a) Write about fundamentals & general consideration of digital filtering. 10

(b) Determine the coefficients of a linear-phase FIR filter of length M=15 which has a symmetric unit, sample response and a frequency response that satisfies the conditions. 10

$$H_r\left(\frac{2\pi k}{15}\right)=\begin{cases}1, & K=0,1,2,3\\ 0.4, & K=4\\ 0, & K=5,6,7\end{cases}$$

7. Write a note on : 10 × 2

(a) Window technique for FIR.

(b) Applications of DSP.

SECTION – D

8. (a) Illustrate the timing relations for sampling rate conversion. 10

(b) Discuss how efficient implementation of sampling rate conversion systems using polyphase filter structures can be done. 10

9. Write about : 10 × 2

(a) Interpolators

(b) A digital filter bank