Roll No. .....

3219

B. Tech. 5th Semester (ECE) Examination – March, 2021

DIGITAL SIGNAL PROCESSING

Paper : PCC-ECE-307-G

Time : Three hours] *[Maximum Marks : 75*

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 : Attempt ***five*** questions in all, selecting ***one*** question from each Section. Question No. **1** is ***compulsory***. All questions carry equal marks.

1. Explain the following : $2.5 \times 6 = 15$

(a) Check the signal for causal or non-causal $Y(n)=0.5x(n)-x(n-2)$.

(b) Explain in brief the application of DSP.

(c) What is nyquist rate ?

(d) Explain in brief the disadvantages of DSP.

P. T. O.

(e) Discuss the advantages of FIR filters over IIR filters.

(f) What do you understand by ROC ?

SECTION – A

2. The analog signal is given by :

$X(t)=5\cos 2000\pi t+ 3\sin 6000\pi t+ 2\cos 12000\pi t$

Determine the nyquist rate of this signal. If the sampling rate fs=5000 samples/s, find the discrete time signal x(n) after sampling.

Also Derive an expression for sampling theorem. 15

3. (a) Find the inverse z transform of : 8

$$x(z)=\frac{z}{3z^2-4z+1}$$

for (a) IZI>1 (b) IZI$<\frac{1}{3}$ (c) $\frac{1}{3}<IZI<1$

(b) Explain the analysis of linear shift invariant system using z transform. 7

SECTION – B

4. Explain the DIT FFT Algorithm. 15

5. (a) State and prove the properties of DFT. 7

(b) Explain the linear filtering using DFT. 8

SECTION – C

6. (a) Compare the IIR and FIR filters. 8

(b) Design IIR filter by using Butterworth filter. 7

7. (a) Design FIR filter using window technique. What is gibbs phenomenon in this ? 10

(b) Distinguish between ideal and practical filters. 5

SECTION – D

8. What is MDSP ? Derive an expression for the design of interpolator and decimator. 15

9. Write short notes on :

(a) Parametric and non-parametric spectral estimation. 8

(b) Digital filter bank 7

UNIT – IV

8. Find the transfer function from the given state model : 15

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}0 & 1\\ -3 & -2\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}0\\ 2\end{bmatrix}4(t)\,;\,y=\begin{bmatrix}1 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}$$

9. (a) Compare classical Transfer function method and state variable method. 7.5

(b) Obtain the solution of homogeneous state equation. 7.5

Roll No. .....

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B. Tech. 5th Semester (EE) Examination – March, 2021

CONTROL SYSTEM

Paper : PCC-EE-305-G

Time : Three Hours] *[Maximum Marks : 75*

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 : Attempt ***five*** questions in all, selecting ***one*** question from each Unit. Question No. 1 is ***compulsory***. All questions carry equal marks.

1. (a) Define the transfer function. 2.5 × 6 = 15

(b) State and explain the Mason's gain formula.

(c) Explain the term disturbance rejection with respect to the controller design.

(d) Define controllability and observability.