Seat No.	

T.Y. B.Tech. (ETC) (Part - III) (Semester - V) (CBCS) Examination, November - 2023

SIGNALS & SYSTEMS

Sub. Code : 80807

8953

Day and Date : Tuesday, 28 - 11 - 2023 **Total Marks : 70**

Time : 10.30 a.m. to 01.00 p.m.

Instructions : **1)** **All questions are compulsory.**

2) **Figures to right indicate full marks.**

Q1) **Answer following MCQ :** **[14]**

a) Graphical representation of a signal in time domain is called

i) Frequency spectrum ii) Frequency

iii) Waveform iv) None of the above

b) The Fourier Transform of x(–t)

i) $X(\omega)$ ii) $X(-\omega)$

iii) $X(1/\omega)$ iv) $-X(\omega)$

c) Frequency spectrum indicates

i) Relative phase of each frequency component

ii) Relative magnitude of each frequency component

iii) Relative frequency of each frequency component

iv) None of the above

d) The time convolution theorem states that $F[x_1(t)*x_2(t)]=$

i) $X_1(\omega)X_2(\omega)$ ii) $X_1(\omega)*X_2(\omega)$

iii) $1/2\pi[X_1(\omega)X_2(\omega)]$ iv) $1/2\pi[X_1(\omega)*X_2(\omega)]$

P.T.O.

e) Aliasing can be reduced by

i) Increasing sampling rate

ii) Band limiting the signal

iii) Improving slope characteristics

iv) All of the above

f) The ROC of the sum of two or more sequences is equal to

i) Intersection of those ROCs ii) Union of those ROCs

iii) Sum of those ROCs iv) Product of those ROCs

g) Long division method cannot yield a sequence which is

i) Causal ii) Non-causal

iii) Two-sided iv) None

Q2) **Attempt any two :** **[14]**

a) Determine whether the following signals are periodic or not? If periodic, determine the fundamental period.

i) $\text{Sin}(0.02\pi n)$ **[3]**

ii) $X(t)=3\sin 200\pi t+4\cos 100t$ **[4]**

b) Obtain convolution of two CT functions given below.

$x(t) = 4$ for $0 \leq t \leq 2$

$= 0$ elsewhere

$h(t) = 2$ for $-2 \leq t \leq 2$

$= 0$ elsewhere

c) Find Fourier transform of $x(t)=\sin\omega_0 t$.

Q3) **Attempt any two :** **[14]**

a) Explain classification of signals.

b) State & explain properties of convolution.

c) Find Fourier transform of $x(t)=e^{-at}u(t)$.

Q4) **Attempt any two :** **[14]**

a) State properties of Discrete Fourier transform and explain any 3 properties.

b) Find Z transform & sketch ROC $x[n]=a^n u[n]$

c) Realize the given system using direct form I

$$H(Z)=\frac{Z^2+4Z+3}{Z^2+2Z+5}$$

Q5) **Attempt any two :** **[14]**

a) Find 4 point DFT of x[n] = {1, 1, 1, 1}

b) State properties of Z transform and explain any 3 properties.

c) Realize the given system using direct form II

$$H(Z)=\frac{Z^2+3Z+4}{Z^2+5Z+2}$$

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