Total No. of Questions : 8]

SEAT No. :

P-1489

[Total No. of Pages : 3

[6002]-116

S.E. (Electronics/E&TC/Electronics & Computer)

SIGNALS & SYSTEMS

(2019 Pattern) (Semester - IV) (204191)

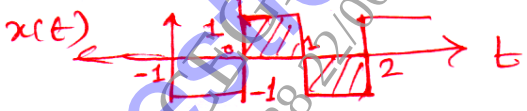
Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***
5) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam table is allowed.***

Q1) a) State the Dirichlet conditions for the existence of Fourier Series. **[4]**

b) Find the Trignometric Fourier Series for the periodic bidirectional symmetric square waveform below. Plot phase and magnitude response. **[8]**



c) State and explain the physical significance for following properties for CT signals. **[6]**

i) Time Differentiation

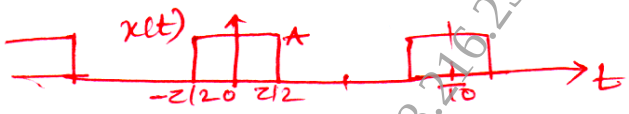
ii) Convolution

iii) Modulation

OR

Q2) a) Define Fourier series, write equations for Fourier series representation. Compare it. **[6]**

b) Determine the complex exponential Fourier Series for periodic Rectangular pulse train shown below. Plot its magnitude and phase spectrum. **[8]**



c) State and explain Gibb's Phenomenon. **[4]**

P.T.O.

Q3) a) What are the limitations of Fourier series. Compare it with Fourier Transform. Write the expression for Fourier Transform for CT Signals. **[5]**

b) Find the Fourier transform of the signal $x(t) = e^{-3t}u(t)$. Also sketch magnitude and phase response. **[6]**

c) State the following properties of CTFT. **[6]**

i) Linearity

ii) Convolution

iii) Time Reversal

OR

Q4) a) Find the Fourier Transform of sine wave signal and sketch magnitude response and phase response. **[6]**

b) Find the Inverse Fourier Transform using partial fraction expansion. **[6]**

$$X(jw) = \frac{1}{(jw)^2 + 5jw + 6}$$

c) Find the Fourier Transform of $x(t) = \cos(w_0 t)u(t)$ using the properly. **[5]**

Q5) a) Define convolution property of Laplace Transform and using same property, determine Laplace Transform of following $y(t)$. **[6]**

$y(t) = x_1(t) * x_2(t)$ where

$x_1(t) = e^{-2t}.\ u(t)$

$x_2(t) = e^{-3t}.\ u(t)$

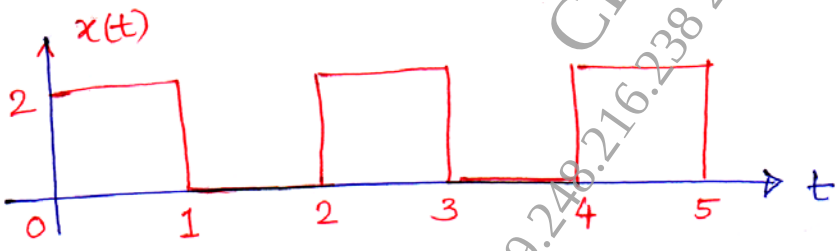
b) State the limitations of Fourier Transform and need of Laplace transform. Compare both. **[6]**

c) Find the initial and final value of given function **[6]**

$$X(S) = \frac{S+4}{S^2 + 3S + 2}$$

OR

Q6) a) Find Laplace Transform of following signal. **[6]**



b) Find the inverse Laplace Transform **[6]**

$$X(S) = \frac{S}{S^2 + 5S + 6}$$

c) A signal has Laplace transform **[6]**

$$X(S) = \frac{S+2}{S^2 + 4S + 5}$$

Find Laplace transform Y(S) if

i) $y(t) = t\ x(t)$

ii) $y(t) = e^{-t}\ x(t)$

Q7) a) Write short note on the following : **[6]**

i) Random experiment

ii) Random event

iii) Sample space

iv) Random variable

v) Probability of certain event is _____

vi) If A and B are mutually exclusive events then P(A + B) = _____

b) A certain computer becomes in operative, if two components A and B both are fails. The probability that A fails is 0.01 and the probability that B fails is 0.05. However the probability B fails increase by factor 4, if A has failed. Calculate the probability that the computer becomes inoperable. Also find the probability that A will fail if B has failed. **[5]**

c) Define CDF and state any four properties of CDF. **[6]**

OR

Q8) a) Define PDF and state four properties of PDF. **[6]**

b) Find mean, second moment and standard deviation of x **[6]**

$$f_x(x) = A.\ e^{-Ax} u(x)$$

c) In a random experiment of rolling a dice Find the probability of **[5]**

i) Getting a number 3 or 4

ii) Getting a number less than 5

iii) Getting a number between 3 and 6

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