Total No. of Questions : 8]

P624

[Total No. of Pages : 3

[Max. Marks : 70

[6]

[4]

SEAT No. :

[5869]-246

S.E. (Electronics/Electronics & Telecommunication) SIGNALSAND SYSTEMS (2019 Patter) (Semester - IV)

Time : 2.30 Hour]

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherver necessary.
- 2) Figures to the right indicate full marks.
- 3) Use of logarithmic tables, slide-rule, mollier charts, electronic pocket calculator steam tables is allowed.
- 4) Assume suitable data if necessary.

Q1) a) What is fourier series. What are the methods of finding fourier series.Write their expressions. [6]

- b) State the following properties of DT fourier series.
 - Time scaling.
 - ii) Linearity.
 - iii) Convolution.
- c) Find out the exponential fourier series for impulse train shown in fig. below. Also plot it's magnitude and phase spectrum. [6]
 - $\cdot \cdot \frac{1}{2} = \frac{1}{2} \cdot \frac{1}{2} \cdot$
- Q2) a) Explain Gibb's phenomenon for fourier series.
 - b) Determine the fourier series for the signal with the periodic wave as shown in fig. below. [8]



- c) State the following properties of fourier series. [6]
 - i) Duality.
 - ii) Time Bandwidth.
 - iii) Parseval's Relation.

P.T.O.

- **Q3)** a) Find the fourier transform of the signal $x(t) = e^{-at} u(t)$. Also sketch magnitude and phase response. [6]
 - b) Obtain the fourier Transform using the property. [6]

i)
$$x(t) = \frac{d}{dt} \left[e^{-at} u(t) \right]$$
ii)
$$x(t) = \delta(t) + e^{-at} u(t)$$

c) State and explain Dirichlet's conditions for the existence of fourier transform. [5]

OR

Q4) a) State any six properties of fourier transform. [6]

b) Obtain the Inverse Fourier Transform of the signal given below. [6]

c) Define Magnitude response and phase response. Obtain the Fourier Transform of impulse response. Also sketch magnitude response of impulse signal.

[6]

[6]

Q5) a) Find the initial and final value of the given function.

$$X(s) = \frac{s+2}{s^2+5s+7}$$

- b) State the limitations of Fourier Transform and need of laplace transform. Compare both. [6]
- c) Given the Laplace transform of.

$$X(s) = \frac{2s}{s^2 + 2}$$

Determine x(t) and Laplace transform of x(3t) and x(t-2).

OR 2

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- Q6) a) State any six properties of Laplace transform.
 - b) Find the Laplace Transform of periodic wave given below. [6]

[6]



- c) Find the inverse Laplace transform of $X(s) = \frac{2}{s(s+1)(s+2)}$ with ROC specified as -1 < Re CS > < 0. [6]
- Q7) a) Abox contains 3 white, 4 red and 5 black balls. A ball is drawn at [6]
 - i) Red.
 - ii) Not Black.
 - iii) Black or white.
 - b) Define PDF and CDF. Also, state the properties of CDF and PDF. $[6]_{-5}$
 - c) Given the pdf for different X values as follows. x = 1, pdf = 0.2, x = 2, pdf = 0.1, x = 3, pdf = 0.3, x = 4, pdf = 0.3, x = 5, pdf = 0.1. Draw the pdf and its corresponding CDF. Also plot the CDF for same. [5] OR
- Q8) a) What are statistical properties of Random Variables. State them (any 3). [6]
 - b) Two fair, six-sided dice are thrown. Find the probability of. [5]
 - i) Throwing a sum of 11.
 - ii) Throwing two 7s.
 - iii) Throwing a pair.
 - c) Consider a fair die, plot a CDF v/s 'x' find the CDF of each value of x plot PDF & CDF.
 [6]

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