Total No. of Questions : 8] **SEAT No. :**

P624 **[Total No. of Pages : 3**

[5869]-246

S.E. (Electronics/Electronics & Telecommunication)

SIGNALS AND SYSTEMS

(2019 Patter) (Semester - IV)

Time : 2.30 Hour] ***[Max. Marks : 70***

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]**

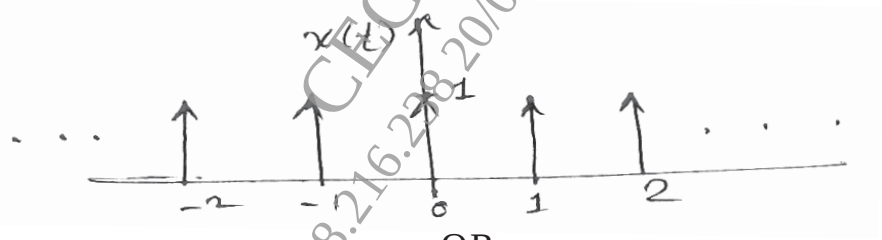
b) State the following properties of DT fourier series. **[6]**

i) Time scaling.

ii) Linearity.

iii) Convolution.

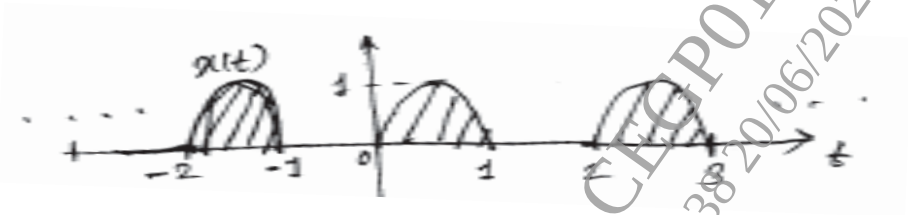
c) Find out the exponential fourier series for impulse train shown in fig. below. Also plot it's magnitude and phase spectrum. **[6]**



OR

Q2) a) Explain Gibb's phenomenon for fourier series. **[4]**

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

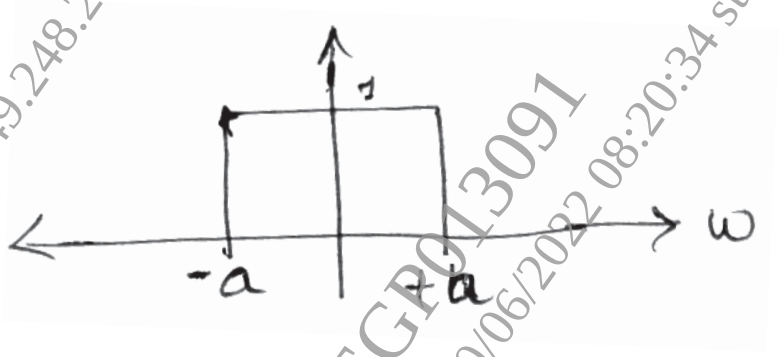
ii) $x(t) = \delta(t) + e^{-at}\, u(t)$

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 . **[5]**

Q5) a) Find the initial and final value of the given function. **[6]**

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

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

c) Given the Laplace transform of. **[6]**

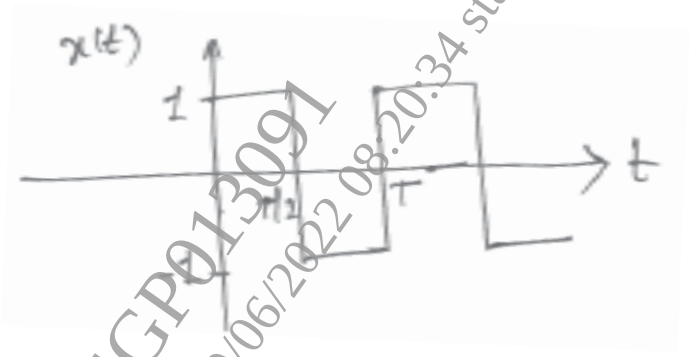
$$X(s) = \frac{2s}{s^2+2}.$$

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

OR

Q6) a) State any six properties of Laplace transform. **[6]**

b) Find the Laplace Transform of periodic wave given below. **[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) A box contains 3 white, 4 red and 5 black balls. A ball is drawn at random find the probability that is. **[6]**

i) Red.

ii) Not Black.

iii) Black or white.

b) Define PDF and CDF. Also, state the properties of CDF and PDF. **[6]**

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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