Total No. of Questions : 8]

SEAT No. :

PC2797

[Total No. of Pages : 4

[6352]-21

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

SIGNALS & SYSTEMS

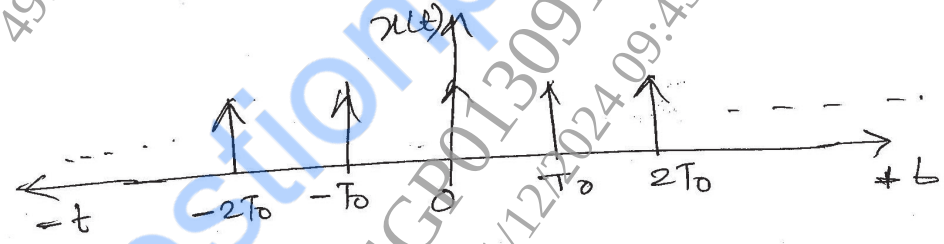
(2019 Pattern) (Semester-IV) (204191)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Find out the exponential Fourier series for impulse train shown in following figure. **[8]**

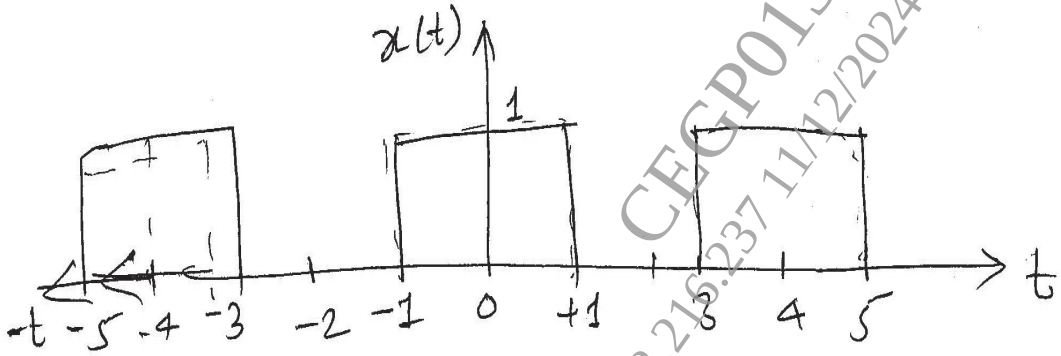


b) Explain Gibb's phenomenon and how to reduce the effect. **[6]**

c) Provide mathematical expression of trignometric and exponential Fourier series. And, give the relation between their coefficients. **[4]**

OR

Q2) a) Find the Trignometric Fourier series for a given signal $x(t)$ **[8]**



P.T.O.

b) State the mathematical expression and physical significance of following CT Fourier series properties. **[6]**

i) Linearity

ii) Modulation

iii) Time shifting

c) State the Dirichlet conditions for the existence of Fourier series. **[4]**

Q3) a) Determine the Fourier Transform of $x(t)=e^{-t}.\ u(t)$. Also, plot magnitude and phase spectrum. **[8]**

b) Find the Fourier Transform of unit step signal. **[6]**

c) State and explain following properties of Fourier Transform. **[3]**

i) Linearity

ii) Time scaling

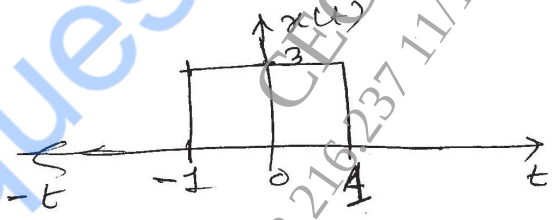
OR

Q4) a) Using the CT Fourier Transform properties, find the Fourier transform of **[8]**

i) $\dfrac{d}{dt}\, e^{-at}u(t)$

ii) 6 sinc $(0.5t)$

b) Find the Fourier Transform of signal given below. **[6]**

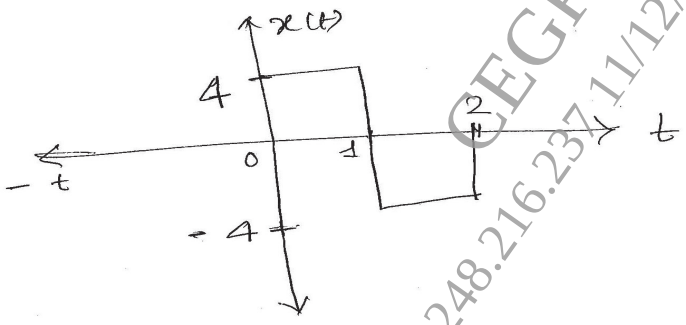


c) Does Fourier Transform exist for the signal **[3]**

$x(t) = e^{2t} \cdot u(t)$

Justify your answer.

Q5) a) Determine the Laplace transform of given signal. Also, sketch ROC. **[8]**



b) Determine the impulse response of the system described by the equation. **[6]**

$$5\frac{d}{dt}y(t)+10y(t)=3x(t)$$

c) State the conditions for stability of a system. Check whether the given $h(t) = e^{-10t}.u(t)$ is stable or unstable. **[4]**

OR

Q6) a) Find inverse laplace transform of **[8]**

$$X(s)=\frac{s+2}{s(s-3)(s+4)}$$

b) Determine the initial value and final value of given **[6]**

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

c) Determine the laplace transform of $x(t) = u(t) * u(t-3)$ **[4]**

Q7) a) CDF of a random variable is **[9]**

$$F_X(x)=\begin{cases}0 & x<0\\ \frac{2x}{5} & 0\le x\le 2\\ k & x>2\end{cases}$$

Find:

i) k value

ii) $P(1\le x\le 2)$

iii) $P(x>2)$

b) State the properties of CDF and PDF. **[8]**

OR

Q8) a) PDF of a random variable is given **[9]**

$$f_X(x) = \begin{cases} kx & -1 \le x \le 2 \\ 0 & \text{otherwise} \end{cases}$$

Find:

i) k,

ii) CDF

iii) $P(0 < x \le 1)$

iv) $P(x > 1)$

b) PDF of Random variable is given as **[8]**

$$F_X(x) = \begin{cases} \dfrac{1}{2\pi} & 0 \le x \le 2\pi \\ 0 & \text{otherwise} \end{cases}$$

Find:

i) Mean

ii) Mean square value

iii) Variance

iv) Standard deviation

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