

Total No. of Questions : 8]

SEAT No. :

PD-4067

[Total No. of Pages : 3

[6402]-26

S.E. (Electronics (VLSI Design & Technology))/
(Electronic/E & TC)/Electronics & Communication - Advanced
Communication Technology)
SIGNALS AND SYSTEMS
(2019 Pattern) (Semester - IV) (204191)

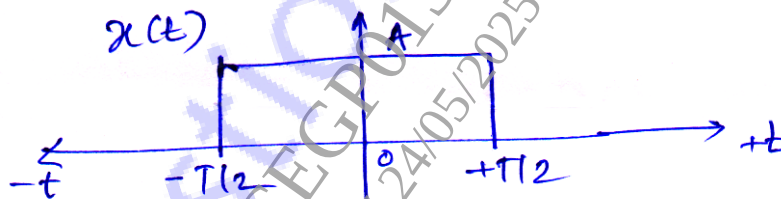
Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of logarithmic tables, slide - rule, mollier charts, electronic packet calculator and steam table is allowed.
- 5) Assume Suitable data if necessary

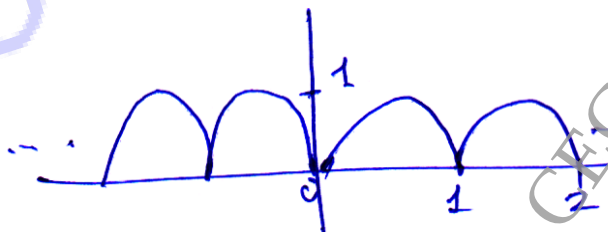
- Q1) a) State any six properties of Fourier series. [6]
b) Obtain the Fourier series of Rectangular pulse given below. [6]



- c) Explain Gibb's phenomenon [6]

OR

- Q2) a) Draw the magnitude and phase spectrum of the signal. [6]
 $x(t) = 5 \cos(2\pi \times 10t + 30) - 10 \cos(2\pi \times 20t + 60)$
b) Determine the FS representation for the signal given by $x(t) = \sin(\pi t)$. [8]
The periodic wave is shown in fig. below.



Full wave Rectifier o/p signal

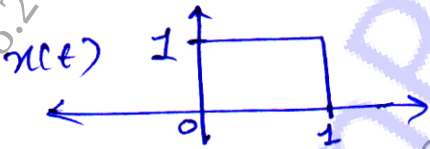
- c) Define magnitude response and phase Response. [4]

P.T.O.

- Q3) a)** Write the formula for the Fourier Transform and Inverse Fourier Transform. Also, obtain Fourier Transform of Impulse function $x(t) = \delta(t)$ [6]
- b)** Find the Fourier Transform of cosine wave signal and sketch magnitude response. [6]
- c)** Find the Fourier Transform of unit step signal $x(t) = u(t)$. [5]

OR

- Q4) a)** Find the Fourier Transform of convolution of 2 signals $x_1(t) = e^{-at} u(t)$ and $x_2(t) = e^{-bt} u(t)$ using the CTFT properties. [6]
- b)** Find the Fourier Transform of sinewave signal and sketch magnitude response. [5]
- c)** Find the Fourier Transform of $x(t)$ given. [6]



- Q5) a)** Compare Fourier Transform and Laplace Transform. [6]
- b)** Obtain the Laplace Transform of $x(t) = e^{-at} u(t)$ and $-e^{-at} u(-t)$ Also sketch ROC for both the signals. [8]
- c)** State Linearity and Time shifting property of Laplace Transform. [4]

OR

- Q6) a)** Find the Initial and Final value of $X(S) = \frac{0.9}{S(S^2 + 5S - 7)}$. [6]
- b)** Find the Laplace Transform of [6]
- i) $u(t - 1)$
- ii) $u(2t)$

Using properties.

- c)** Find the Inverse Laplace Transform of $X(S) = \frac{3S + 7}{(S^2 - 2S - 3)}$. [6]

Q7) a) Define the following terms of probability [6]

- i) Sample space
- ii) Event
- iii) Probability

b) Let these be balls in a box. There are balls of two colors namely Red and Blue. There are 3 Red Balls and 2 Blue Balls. Find the probability of picking up of Red Ball first and A Blue Ball on second pick. [5]

c) Define CDF and PDF. Write the properties of CDF and PDF. [6]

OR

Q8) a) A random variable has probability density function given by the following

equation $f_x(x) = 0.1x \quad 3 \leq x \leq y$ [8]
 $= 0 \quad \text{otherwise}$

- i) Find the mean value
- ii) Find the mean square value
- iii) Find the variance
- iv) Standard deviation

b) A certain random variable has the CDF given by [9]

$$\begin{aligned} f_x(x) &= 0 \text{ for } x \leq 0 \\ &= kx^2 \text{ for } 0 < x \leq 10 \\ &= 100k \text{ for } x > 10 \end{aligned}$$

Find the value of

- i) K
- ii) $p(x \leq 5)$
- iii) $p(5 \leq x \leq 7)$

plot corresponding PDF.

