SEAT No. :

[Total No. of Pages : 4

[5925]-216

S.E.(Electronics & Computer/Electronics/E&TC)
SIGNALS AND SYSTEMS
(2019 Pattern) (204191) (Semester - IV)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

   1)   *Neat diagrams must be drawn wherever 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. Write formula for exponential and Trignometric Fourier series.   **[6]**

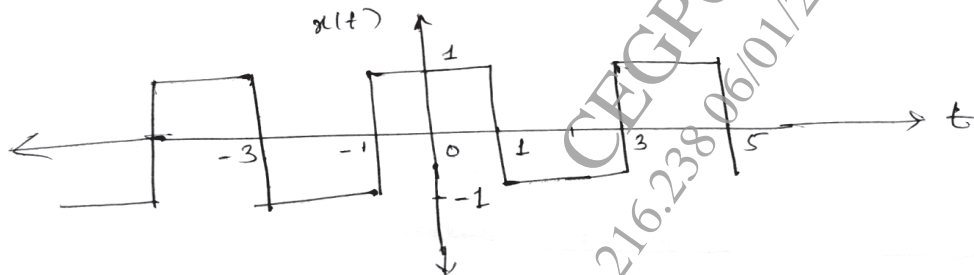   b) State and explain following properties.   **[6]**

        i)   Time reversal

        ii)   Time Differentiation

        iii) Convolution

     c) Determine the FS representation for the signal with periodic wave, shown below using exponential method.   **[6]**
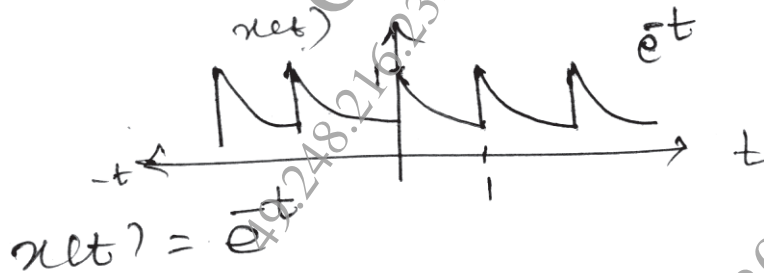
Q2) a)   Find the trignometric Fourier series for the periodic signal $x(t)$ given below.   **[8]**

P.T.O.

b) State the following properties of CTFS. **[6]**

    i) Time scaling

    ii) Time Integration

    iii) Modulation

c) Explain Gibb's phenomenon of Fourier series. **[4]**

Q3) a) Find the Inverse Fourier Transform using partial fraction expansion. **[7]**

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

b) Find the Fourier Transform of a constant signal AO. **[6]**

c) Find the Fourier Transform of a **[4]**

    i) $x(t) = \delta(t) + u(t)$

    ii) $x(t) = u(-t)$

    Using properties of F.T.

Q4) a) State any six properties of Fourier Transform. **[6]**

b) Find the Fourier Transform of the signum function. **[7]**

c) Obtain the Inverse Fourier Transform of **[4]**

$$X(jw) = \frac{2}{jw+1} + \frac{1}{jw+2}.$$

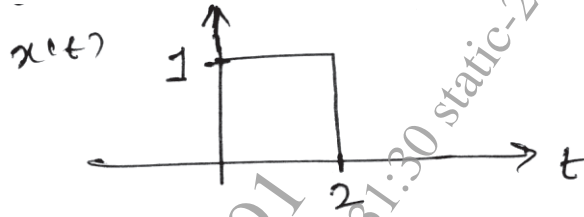**Q5)** a) Find the Laplace Transform and find ROC. **[6]**

$$x(t) = e^{-3t}u(t) + e^{-2t}u(t)$$

b) State and explain Initial value theorem and final value theorem. **[6]**

c) Find the Inverse Laplace Transform of $X(s) = \dfrac{2}{(s+4)(s-1)}$ if the ROC

is $-4 \leq R_e(s) < 1$. **[6]**

OR

Q6) a) Find the Laplace Transform of the signal drawn below Find ROC. **[6]**

b) Solve the differential equation $\dfrac{dy(t)}{dt}+3y(t)=x(t)$ for input $x(t)=e^{-2t}u(t)$. Assume zero initial conditions. **[6]**

c) Find the Laplace Transform of following using the properties. **[6]**

i) $x(t)=\dfrac{d}{dt}u(t)$

ii) $x(t)=u(t+1)$

Q7) a) Define the following terms: **[6]**

  i) Probability

  ii) Joint Probability

  iii) Conditional probability

b) A coin is tossed three times. Write the sample space which gives all possible out comes. A random variable X. Which represents the number of heads obtained on any tripple toss. Calculate and draw the CDF and PDF. **[7]**

c) In a pack of cards, 2cards are drawn simultaneously. What is the probability of getting a Queen and Jack combination. **[4]**

OR

Q8) a) Define probability. Also write the properties of probability. **[5]**

b) A perfect die is thrown. Find the probability that **[6]**

  i) You get even number

  ii) You get perfect square

c) The probability density function of a random variable 'X' is given by

$$f_x(x) = \frac{1}{a} \qquad |x| \leq a$$
$$= 0 \qquad \text{otherwise}$$

[6]

Determine :
    i) Mean
    ii) Mean square
    iii) Standard deviation

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