## S.E. (Electronics/Electronics \& Telecommunication)

## SIGNALSAND SYSTEMS

(2019 Patter ) (Semester - IV)
Time : 2.30 Hour]
[Max. Marks : 70
Instructions to the candidates:

1) Neat diagrams must bedrawn wherver necessary.
2) Figures to the rightindicate full marks.
3) Use of logarithmice tables, slide-rule, mollier charts, electronic pocket calculator steam taibles is allowed.
4) Assume suitable data if necessary.

Q1) a) What is fourier series. What are the methods offinding fourier series. Write their expressions.
b) State the following properties of DT fourier Series.
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.


OR
Q2) a) Explain Gibb's phenomenon for fourier series.
b) Determine the fourier series for the signal with the perigdic wave as shown in fig. below.

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

Q3) a) Find the fourier transform of the signal $x(t)=e^{- \text {at }} u(t)$. Also sketch magnitude and phase response.
b) Obtain the fourier Transform using the property.
i) $\quad x(t)=\frac{d}{d t}\left[e^{7^{a t}} u(\mathrm{t})\right]$
ii) $\quad x(t)=\delta(t)+e^{-a} \boldsymbol{w}(t)$
c) State and explain Dirichlet's conditions for the existence of fourier transform.

Q4) a) State any six properties of fourier transform.
b) Obtainthe Inverse Fourier Transform of the signalgiven below.

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

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

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

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

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

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

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

c) Find the diverse Laplace transform of $\mathrm{X}(\mathrm{s})=\frac{20}{\mathrm{~s}(\mathrm{~s}+1)(\mathrm{s}+2)}$ with ROC specified as $-1<\operatorname{Re} C S><0$.

Q7) a) A box contains 3 white, 4 red and 5 black balls. A ball is drawn at xandom find the probability that is
[6]
i) Red.
ii) Not Black.
iii) Black or white.
b) Define PDF and CDF. Aiso, state the properties of CDF and PDF. [6]
c) Given the pdf for differenn values as follows. $x=1, \operatorname{pdf}=0.2, x=2$, pdf $=0.1, x=3, \operatorname{pdf}=0.3, x=4, \operatorname{pdf}=0.3, x=5, \operatorname{pdf}=0.1$. Draw ethe pdf and its corresponding CDF. Also plot the CDF for same.

## OR

Q8) a) What are statistical properties of Random Variables. State them (any 3).
b) Two fair, six-sided dice are thrown. Find the probability of.
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.

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