Q.P. Code :11966

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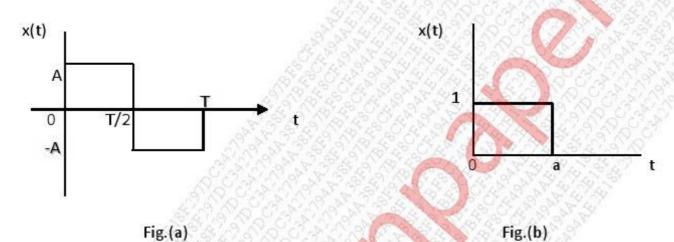
[Time: 3 Hours] [Marks:80]

Please check whether you have got the right question paper.

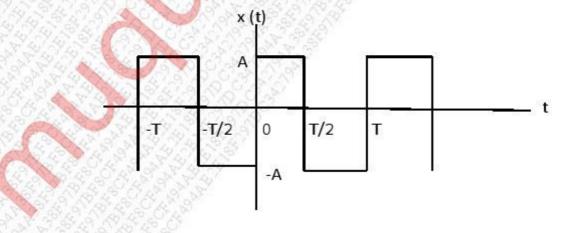
- N.B: 1. Question No.1 is compulsory.
 - 2. Solve any THREE from the remaining FIVE questions.
 - 3. Assume suitable data if required.
- Q.1 a) What is cross correlation and auto correlation of the system.



- b) Determine the even and odd part of the following continuous time signals.
 - i) $x(t) = \sin 2t + \cos 2t + \sin t \cos 2t$
 - ii) $x(t) = e^{-t} u(t)$
- c) Determine the Laplace transform of the given signals:-



- d) Determine whether the given systems are linear or non linear.
 - i) $y(t) = x^2(t)$
 - ii) $y(t) = e^{x}(t)$
- e) Justify the following with Fourier series,
 - i) Odd functions only have sine terms and even function have no sine terms
- Q.2 a) Prove the following properties of Fourier Transform.
 - i) Time shifting ii) Frequency Scaling iii) Time Convolution iv) Time Scaling
 - b) Determine the Fourier series of the following signal shown:-



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Q.3 a) Find the transfer function, impulse response and step response of a Continuous time LTI system, also sketch the impulse and step response.

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 $\frac{dy(t)}{dt} + 2y(t) = 3x(t)$

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b) An LTI system is described by the equation:-

y[n] = x[n] + 0.8 x[n-1] + 0.8x[n-2] - 0.49 y[n-2]

Determine the transfer function of the system. Sketch the poles & zeros of the z-plane.

Q.4 a) Perform circular convolution of the two sequences by using tabular Array and by using Metrics method. $x_1[n] = \{2,1,2,1\}$ and $x_2[n] = \{1,2,3,4\}$

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- b) Solve the difference equation for a given system using Z-transform.

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- y[n] 3y[n-1] 4y[n-2] = x[n] + 2x[n-1]
- Q.5 a) Explain Gibbs phenomena, also explain the condition necessary for convergence for Fourier series.
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b) Determine the power and energy of the following continuous time signals:-

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- i) $x(t)=e^{-2t}u(t)$
- $x(t) = e^{j(2t + \frac{\pi}{4})}$ ii)
- c) Find the inverse Laplace transform of:-

 $-2>Re {s}>-4$

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- X(S) = 4/(S+2)(S+4) if the ROC is
 - ii)
- Re {s} <-4
- ii) Re {s} > -2
- Q.6 a) Determine the inverse Z-transform of the following function:-

5+5

- $X(Z) = 1/(1-1.5 Z^{-1} + 0.5 Z^{-2})$ i)
- $X(Z) = Z^2/(Z^2-Z+0.5)$ ii)

b) Determine the convolution of the following signals using Z-transform,

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 $x_1[n] = n u[n]$ $x_2[n] = 2^n u [n-1]$

i)