



# SRI VASAVI ENGINEERING COLLEGE

(Sponsored by Sri Vasavi Educational Society)

Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada  
Pedatadepalli, **TADEPALLIGUDEM – 534 101**, W.G. Dist, (A.P.)

## Department of Electronics and Communication Engineering

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Academic Year: 2017-2018

Signals and Systems

Question Bank

### UNIT I

1. Define Signal.
2. Define system.
3. What are the major classifications of the signal?
4. Define discrete time signals and classify them.
5. Define continuous time signals and classify them.
6. Define discrete time unit step & unit impulse.
7. Define continuous time unit step and unit impulse.
8. Define unit ramp signal.
9. Define periodic signal and nonperiodic signal.
10. Define even and odd signal ?
11. Define Energy and power signal.
12. Define unit pulse function.
13. Define continuous time complex exponential signal.
14. What is continuous time real exponential signal.
15. What is continuous time growing exponential signal?
16. State the BIBO criterion for stability.
17. Find whether the signal given by  $x(n) = 5\cos(6\omega N)$  is periodic signal.
18. (a) For the systems represented by the following functions. Determine whether every system is  
(1) stable (2) Causal (3) linear (4) Shift invariant
  - (i)  $T[x(n)] = e^{x[n]}$
  - (ii)  $T[x(n)] = ax[n] + 6$
19. Determine whether the following systems are static or Dynamic, Linear or Nonlinear, Shift variant or Invariant, Causal or Noncausal, Stable or unstable. (4)
  - (i)  $y(t) = x(t+10) + x^2(t)$
  - (ii)  $dy(t)/dt + 10y(t) = x(t)$
20. Find which of the following signal are energy or power signals. (8)
  - a)  $x(t) = e^{3t}u(t)$
  - b)  $x(t) = e^{j(2t+\pi/4)}$
  - c)  $x(n) = \cos((\pi/4)n)$
21. Explain the classification of signals with examples. (8)
22. Explain orthogonal signals
23. What is MSE.

### UNIT II Fourier series & Fourier Transforms

1. Write down the exponential form of the Fourier series representation of a Periodic signal?
2. Write down the trigonometric form of the fourier series representation of a periodic signal?
3. Write short notes on dirichlets conditions for fourier series.
4. State Time Shifting property in relation to fourier series.
5. State parseval's theorem
6. Explain about the properties of continuous time fourier series. (8)
7. Find the fourier coefficients of the given signal. (4)  
 $x(t) = 1 + \sin 2\pi t + 2 \cos 2\pi t + \cos(3\pi t + \pi/3)$



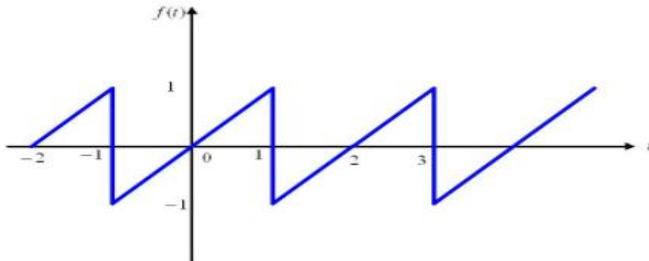
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8. Find the trigonometric and exponential Fourier series for the periodic signal  $f(t)$  shown in the figure.



9. Explain the properties of Discrete time fourier serier (8)
10. Find the cosine fourier series of an half wave rectified sine function. (8)
11. Define fourier transform pair
12. Write short notes on dirichlets conditions for fourier transform
13. Properties of fourier transform

### UNIT III SAMPLING THEOREM

1. Why CT signals are represented by samples.
2. What is meant by sampling.
3. State Sampling theorem.
4. What is meant by aliasing.
5. What are the effects aliasing.
6. How the aliasing process is eliminated.
7. Define Nyquist rate.and Nyquist interval.
8. Define sampling of band pass signals.
- 9.State and prove the sampling theorem. Also explain how reconstruction of original signal is done from sampled signal.
10. Explain Band pass sampling

### UNIT IV Analysis of Linear Systems

1. Define Transfer function.
2. Define impulse response of a system.
3. State the significance of difference equations.
4. Write the differece equation for Discrete time system.
5. Define frequency response of a system.
6. What is the condition for stable system.
7. What are the properties of convolution?
9. State properties of convolution?
10. Define causal system.
11. Define continuous time system.
12. Determine the conditions for the distortionless transmission through a system
13. Define a causal system.
14. What is meant by linear system?
15. Define time invariant system.
16. Define stable system?



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17. Define memory and memoryless system.
18. Define invertible system.
19. What is superposition property?

### UNIT V Laplace Transforms

1. What is natural response?
2. What is zero input Response?
3. What is forced response?
4. What is complete response?
5. Determine the inverse laplace of the following functions. (6)  
1)  $1/s(s+1)$  2)  $3s^2 + 8s + 6 / (s+2)(s^2+2s+1)$
6. Discuss the condition on stability of an LTI system based on Laplace domain representation. (3)
7. Bring the equivalence between Laplace transform and Fourier transform.(5)
8. Explain the properties of laplace transform (8)
7. Find the impulse and step response of the following systems  $H(s) = 10/s^2+6s+10$  (6)
8. For the transfer function  $H(s) = s+10 / s^2+3s+2$  find the response due to input  $x(t) = \sin^2(t) u(t)$  (6)
9. What is the use of Laplace transform?
10. What are the types of laplace transform?
11. Define Bilateral and unilateral laplace transform.
12. Define inverse laplace transform.
13. State the linearity property for laplace transform.
14. State the time shifting property for laplace transform.
15. Region of convergence of the laplace transform.
16. What is pole zero plot.
17. State initial value theorem and final value theorem for laplace transform.
18. State Convolution property.
19. Find the laplace transform of  $e^{-5t}[u(t) - u(t - 5)]$
20. Find the inverse laplace transform of  $X(s) = \frac{2s}{(s+1)(s+2)}$  for all possible ROC conditions

### UNIT VI Z Transforms

1. Define Z transform
2. What are the two types of Z transform?
3. Define unilateral Z transform.
4. What is region of Convergence.
5. What are the Properties of ROC.
6. What is the time shifting property of Z transform.
7. What is the differentiation property in Z domain.
8. State convolution property of Z transform.
9. State the methods to find inverse Z transform.
10. State multiplication property in relation to Z transform.
11. State parseval's relation for Z transform.
12. What is the relationship between Z transform and fourier transform.
13. What is meant by step response of the DT system.



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14. Find the Z – transform of the signal (8) (i) $x(n) = na^n u[n]$  (ii) $x(n) = a^n \cos(\omega n) u[n]$

15. Explain the properties of Z transform (8)

16. Using the power series expansion technique, Determine the inverse Z-transform

$$X(z) = \frac{z}{2z^2 - 3z + 1}; \quad \text{ROC}; |z| > 1$$

17. Find the inverse Z transform of  $x(z) = \frac{z}{z(z-1)(z-2)^2}$  using residue method(8)

18. Give the relationship between Z transform and Fourier transform. (8)

19. Using the partial fraction method find inverse Z-transform

$$X(z) = \frac{z}{2z^2 - 3z + 1}; \quad \text{ROC}; |z| > 1$$