Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **18EC2005** | **Duration :** | **3hrs** |
| **Sub. Name :** | **SIGNALS AND SYSTEMS** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
| **PART – A (10X1 = 10 MARKS)** | | | |
| 1. | Find the even components of the signal *x(t) = cost + sint + cost sint.* | CO1 | 1 |
| 2. | Show the signal *x(n)=2u(n-2).* | CO1 | 1 |
| 3. | Find the number of samples in the output y[n]. If input x[n]=[1,2,3,2,4,2,3]  and impulse response h[n]=[1,2,4]. | CO2 | 1 |
| 4. | Define LTI System. | CO2 | 1 |
| 5. | Find the CTFT of u(t). | CO3 | 1 |
| 6. | List the first harmonicequation. | CO3 | 1 |
| 7. | If L(x(t)) = X(s), then L(x(-t)) is \_?\_\_\_\_\_\_\_\_\_. | CO4 | 1 |
| 8. | Define Aliasing. | CO4 | 1 |
| 9. | Find the DTFT of x(n) = {1,3,2}. | CO5 | 1 |
| 10. | State the parsevals relation for discrete time signals using Fourier transform. | CO5 | 1 |

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| **PART – B (6 X 3 = 18 MARKS)** | | | |
| 11. | Test whether the following signal is periodic or not.  x(t)=2cos(10t+1)-sin(4t-1) | CO1 | 3 |
| 12. | Test the linearity property of the system.  y(t) = x2[t]+2x[t+1] | CO2 | 3 |
| 13. | State the dirichlet conditions for Fourier Series. | CO3 | 3 |
| 14. | Consider the signal x(t)=cos(6πt)+sin(8πt), where t is in seconds. Find the nyquist sampling rate (in samples/second) for the signal y(t)=x(2t+5). | CO4 | 3 |
| 15. | Determine the spectral coefficients by using DTFS. | CO5 | 3 |
| 16. | Determine Z transform for the signal x(n) =3(1/3)n u(n) - 6(1/2)nu(n) and  plot its ROC. | CO6 | 3 |

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| **PART – C (6 X 12= 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23. Q.No 24 is a Compulsory Question)** | | | | | |
| 17. |  | | Show the following signal which are derived from x(n)   1. x(3n+4) (ii) [x(n)+x(n+1)] (iii) 2x(n-1) (iv) x(-n+2) (v) x(n-4) | CO1 | 12 |
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| 18. |  | | Test the properties of the system y(t) = 2x(t)+3x(t–1)  i) Static or Dynamic. ii) Linear or Non-linear.  iii) Time invariant or variant. iv) Causal or Non- causal. | CO2 | 12 |
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| 19. |  | | List and derive any four properties of CTFT. | CO3 | 12 |
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| 20. | a. | | A signal has laplace transform of X(s)=s+2/(s2+4s+5). Find LT of Y(s) for the following signal:   1. y1(t)=e-tx(t) 2. y2(t) = x(2t) | CO4 | 6 |
| b. | | Find the Laplace Transform and ROC of the given signal:  x(t)=e-4t u(t)+ e-3t u(-t) | CO4 | 6 |
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| 21. |  | | Consider a causal and stable LTI system whose input x(n) and output y(n) are related through the second order difference equation.  y(n)-(3/4)y(n-1)+(1/8)y(n-2)=2x(n)   1. Find the frequency response, impulse response. 2. Determine the output response of the system for the given signal x(n)=(1/4)nu(n) | CO6 | 12 |
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| 22. |  | | Explain the reconstruction of signals from its samples with necessary diagrams. | CO4 | 12 |
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| 23. | a. | | The input x(n) and impulse response h(n) of a filter is given below.  Find the response of the filter.  h(n)=an u(n) for all n  x(n)=bn u(n) for all n | CO2 | 6 |
| b. | | Find the convolution of input signal x(t) and impulse response h(t)  x(t)= 1 for 0≤t≤2  h(t)=1 for 0≤t≤3 | CO2 | 6 |
|  | **Compulsory:** | | | | |
| 24. |  | Find x(n) by using long division method:  X(Z)=(1+2z-1 )/(1-2z-1 +z -2 )  (i) x(n) is causal  (ii) x(n) is anticausal | | CO6 | 12 |