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



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

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **17EC2003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **SIGNALS AND SYSTEMS** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Find the convolution of the following sequence  x(n)=2δ(n+1)-δ(n)+δ(n-1)+3δ(n-2)  h(n)=3δ(n-1)+4δ(n-2)+2δ(n-3) | CO1 | 5 |
| b. | Test the properties of the following system  y(t) = cos (x(t))  i) Static or Dynamic  ii) Linear or Non-linear  iii) Shift invariant or variant  iv) Causal or Non- causal. | CO1 | 15 |
| **(OR)** | | | | |
| 2. | a. | Using Classical method, solve  if the initial conditions are y(0) = 9/4; = 5; and *x(t)* = *e-3tu(t)* | CO1 | 15 |
| b. | Find the convolution of two infinite duration sequence h(n)=anu(n) for all n and x(n) = bnu(n) for all n. | CO1 | 5 |
|  |  |  |  |  |
| 3. | a. | Find the fourier transform for the following signal and sketch the frequency response.  x(t)=e-at u(t) | CO4 | 10 |
| b. | State and derive parsevals theorem, convolution property of CTFT. | CO4 | 10 |
| **(OR)** | | | | |
| 4. | a. | Determine the Trigonometric Fourier series for the continuous time periodic signal.  x(t)=t for -1 ≤t ≤ 1.  with fundamental period T=2 sec. | CO2 | 17 |
| b. | List the conditions for existence of fourier series. | CO4 | 3 |
|  |  |  |  |  |
| 5. | a. | Determine the sampling frequency so that x(t) is uniquely represented by the discrete –time sequence x(n) = x(nTs)  Given x(t) = 5cos(50πt) + 2 sin (200πt) – 2 cos(100πt). | CO3 | 15 |
| b. | State any four properties of Laplace Transforms. | CO5 | 5 |
| **(OR)** | | | | |
| 6. | a. | Explain discrete-time processing of continuous –time signals with a neat block diagram. | CO6 | 15 |
| b. | If x(t) = sin (10πt) / ( πt), determine sampling time Ts. | CO3 | 5 |
|  |  |  |  |  |
| 7. | a. | State and prove the Time scaling, Time shifting, Time Reversal, linearity properties of DTFT. | CO5 | 10 |
| b. | Compute the Fourier series coefficients of | CO5 | 10 |
| **(OR)** | | | | |
| 8. | a. | Find the DTFT of x(n) = {1,-1,2,2,2,2} | CO5 | 5 |
| b. | Use Fourier transform to find the output of the system whose  impulse response, h(n) = (1/5)n u(n) and the input of the system is  x(n) = (1/3)n u(n). | CO6 | 8 |
| c. | State and prove the parsevals relation for discrete time signals using Fourier transform. | CO5 | 7 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Find the Laplace Transform and ROC of the given signals:   1. x(t)=e-4t u(t)+ e-3t u(-t). 2. x(t)= δ(6-2t)+ δ(6-2t). | CO2 | 10 |
| b. | Perform long division method to find x(n):  X(Z)=(1+2z-1)/(1-2z-1+z-2)  (a) x(n) is causal.  (b) x(n) is anticausal. | CO5 | 10 |