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

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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **14EC2003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **SIGNALS AND SYSTEMS** | **Max. marks :** | **100** |

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | For the signal x(t) , find (i) x(t+1) (ii) x(2-2t) (iii) 3x(t/3) | CO1 | 10 |
| b. | Find the periodicity of the signals:  x[n] = 10cos(20πn) + 5 sin (4πn)  x(t) = e-j(4π/3)t | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Let be a DT signal with  Find in graphical representation.  (i)  (ii)  (iii) | CO1 | 10 |
| b. | Determine whether the given systems are memoryless, time invariant, linear and causal  i)  ii) y(t) = x(t2). | CO1 | 10 |
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| 3. | a. | Perform convolution of the following signals  x(t) = e-2t u(t); h(t) = e-3t u(t). | CO1 | 10 |
| b. | Find the causality and stability of the system whose impulse response is given by h[n] = 2n u[-n] | CO1 | 10 |
| (OR) | | | | |
| 4. | a. | An LTI system is characterized by its impulse response h[n] = {2,1,3, 4}. Determine the response of the system to an input x[n] = {1,2,0,2} graphically and verify the result using the matrix method. | CO1 | 10 |
| b. | Find the convolution between *x*(n) and *h*(n) if | CO1 | 10 |
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| 5. | a. | Find the CTFT of (i) x(t) = e-at u(t) (ii) x(t) = δ(t) | CO2 | 8 |
| b. | State and Prove any four properties of Laplace Transform | CO2 | 12 |
| (OR) | | | | |
| 6. | a. | Determine the frequency response and impulse response of a CT system represented by thedifferential equation | CO2 | 10 |
| b. | Find the Laplace transform and ROC for the following signal   1. x(t) = cos 3t u(t) (ii) y(t)=e-b|t| | CO2 | 10 |
|  |  |  |  |  |
| 7. | a. | Show that a signal x(t) can be uniquely reconstructed from its samples if its sampling frequency Fs> 2Fm. | CO3 | 10 |
| b. | State and prove any four properties of DTFT | CO3 | 10 |
| (OR) | | | | |
| 8. | a. | Derive the frequency response and impulse response of the causal system described by the difference equation  y(n)-0.25y(n-1)-0.375 y(n-2)=x(n)+x(n-1). | CO3 | 10 |
| b. | Determine the Nyquist Sampling Rate of the signal  x(t) = 5cos(50πt) + 2 sin (200πt) – 2 cos(100πt) | CO3 | 5 |
| c. | Find the DTFT of x[n] = (1/2)n u[n] | CO3 | 5 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | By using Long Division method, Find the inverse Z transform of  X(Z)=(1+5z-1 )/(1-5z-1+z-2) when   1. x(n) is causal 2. x(n) is anti causal | CO3 | 10 |
| b. | Find the Z transform and ROC of the following signals   1. x(n)=nu(n) 2. x(n)=7(1/3)n u(n)-6(1/2)n u(n) | CO3 | 10 |