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



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

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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. | Construct the following signals which are derived from *x(n)*  (i) *x(3n+4)* (ii) *[x(n)+x(n+1*)] (iii*) 2x(n-1)*  (iv) *x(-n+2)* (v) 0.5*x(n-4)* | CO1 | 15 |
| b. | Find the output of the system whose impulse response  *h(n)* = {1, 2, - 1, 3} and the input *x(n)* = {1, 2, 1}. | CO1 | 5 |
| **(OR)** | | | | |
| 2. | a. | The square pulse signal x(t) is given below. Sketch each of the following signals derived from x(t)  x (t)  t  1  -1  1   1. x (3t+2) 2. x(-2t-1) | CO1 | 10 |
| b. | Check whether the following signals are energy signal or power signal by computing the total energy and average power.   1. x(t)=cos t 2. x[n]=(1/3)nu(n) | CO1 | 10 |
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| 3. | a. | State and prove any five properties of CTFT. | CO2 | 15 |
| b. | Find the Frequency response of an LTI system described by the differential equation | CO2 | 5 |
| **(OR)** | | | | |
| 4. |  | Consider a stable LTI system characterized by the differential equation +6+=2x(t). Apply Fourier Transform and find:  i) the impulse response of the system  ii) the response of the system if x(t)=te-2t u(t) | CO2 | 20 |
| 5. | a. | Compute the laplace transform and ROC for the following signals x(t)=e-b|t| | CO2 | 10 |
| b. | Find the Nyquist rate and Nyquist interval for the following signal  x(t)= sin(4000πt) sin(1000πt) | CO3 | 10 |
| **(OR)** | | | | |
| 6. |  | Explain the discrete time processing of continuous time signals with necessary diagrams and equations. | CO3 | 20 |
|  |  |  |  |  |
| 7. | a. | Compute the laplace transform and ROC for the following signal  x(t)=e-2t u(t)+ e-tcos 3t u(t) | CO2 | 10 |
| b. | Analyze the output for a system described by its transfer function *H(s)* = for a step input. | CO2 | 10 |
| **(OR)** | | | | |
| 8. | a. | Find the DTFT of the following signals   1. x(n)= {1,-1,2,2} 2. x(n)= (0.5)nu(n)+2-nu(-n-1) | CO3 | 8 |
| b. | Consider an LTI system which is characterized by the difference equation y(n)-(3/4)y(n-1)+(1/8)y(n-2)=2x(n). Determine the output of the system for the input x(n)=(1/4)nu(n) | CO3 | 12 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Using z transform, find the step response for the following system. | CO3 | 10 |
| b. | Find the inverse Z transform of  by using partial fraction expansion technique. | CO3 | 10 |