**18EE404**

**Hall Ticket Number:**

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| **II/IV B.Tech (Regular/Supplementary) DEGREE EXAMINATION** | | | |
| **August, 2021** | **Electrical & Electronics Engineering** | | |
| **Fourth Semester** | **Signals and Systems** | | |
| **Time:** Three Hours | | **Maximum: 5**0 Marks | |
| *Answer Question No. 1 Compulsorily.* | | | (10X1 = 10 Marks) |
| *Answer* ***ANY ONE*** *question from each Unit.* | | | (4X10=40 Marks) |

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| 1. | a) | Sketch the signal x(n) = u(n+3) – u(n-4). | CO1, |  |
|  | b) | Compare Even and Odd signals. | CO1 |  |
|  | c) | Check whether the system y(t) = x(t2) is causal or non-causal? | CO1 |  |
|  | d) | Determine whether the LTI system with impulse response h(t) = e-t u(t+2) is stable or not? | CO2 |  |
|  | e) | Find the output y(n) = x[n] \* h[n]. Where x[n] = [1,2] ; h[n] = [2,1] | CO2 |  |
|  | f) | What is the relationship between Fourier transform and Z-transform? | CO3 |  |
|  | g) | What are the advantages of Z-Transform? | CO3 |  |
|  | h) | What is the sufficient condition for the existence of DTFT? | CO3 |  |
|  | i) | What is aliasing? | CO4 |  |
|  | j) | Define Nyquist rate. | CO4 |  |
| **Unit - I** | | | | |
| 2. | a) | Examine whether the following signals are periodic or not? If periodic determine the fundamental period.   1. x(t) = 2 sin 100πt + 3 cos 200πt. 2. x(n) = cos().cos() | CO1 | **5M** | |
|  | b) | Determine whether the signal is energy signal or power signal. Also find the energy and Power of the signal. | CO1 | **5M** | |
|  |  | **(OR)** |  |  | |
| 3. | a) | Explain about various continuous-time signals. | CO1 | **5M** | |
|  | b) | Check whether the following systems are linear, causal, time-invariant and stable.   1. y(t) = x(t) - x(t-3) 2. y(n) = x(n).u(n+2) | CO1 | **5M** | |
| **Unit – II** | | | | |
| 4. | a) | Derive the relationship between input, output and impulse response of an LTI system | CO2 | **5M** | |
|  | b) | Compute the convolution of the following signals.  x(t) = e-3t u(t) and h(t) = e-3t u(t-3). | CO2 | **5M** | |
|  |  | **(OR)** |  |  | |
| 5. | a) | Derive the conditions for causality and stability of an LTI system. | CO2 | **5M** | |
|  | b) | Find the step response of a continuous-time LTI system whose impulse response is given by h(t) = t.e-t u(t). | CO2 | **5M** | |
| **Unit – III** | | | | |
| 6. | a) | Determine the Fourier series coefficients of the signal x(t) = 3 cos ( + ).  Plot the magnitude and phase spectra. | CO3 | **5M** | |
|  | b) | Find the inverse z-transform of X(Z) = with ROC |Z| > 1 | CO3 | **5M** | |
|  |  | **(OR)** |  |  | |
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| 7. | a) | Find the Fourier transform of the signal x(t) = | CO3 | **5M** | |
|  | b) | State and prove any four properties of DTFT. | CO3 | **5M** | |
| **Unit – IV** | | | | |
| 8. | a) | State and prove the sampling theorem for band-limited signals. | CO4 | **5M** | |
|  | b) | Determine the Nyquist Rate and Nyquist Interval for the signal  x(t) = 10 sin(60πt).cos(40πt) | CO4 | **5M** | |
|  |  | **(OR)** |  |  | |
| 9. | a) | Explain how the original signal is reconstructed from the sampled signal? | CO4 | **5M** | |
|  | b) | Explain about zero-order hold and first-order hold sampling. | CO4 | **5M** | |

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