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INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

II B.Tech I Sem Supply End Examination, October 2021

SIGNALS AND SYSTEMS

(ECE)

Time: 3 Hours.**Max. Marks: 70**

Note: 1. Answer any FIVE questions.

2. Each question carries 14 marks and may have a, b as sub questions.

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|---|----|---|----|-----|------|
| 1 | a) | Define the orthogonal signal space and signal approximation using orthogonal functions | 7M | C01 | BL1 |
| | b) | Explain the analogy of vectors and signals in terms of orthogonality and evaluation of constant | 7M | C01 | BL 1 |
| 2 | a) | Prove that the complex exponential signals are orthogonal functions $x(t)=e^{j\omega t}$ and $y(t)=e^{j\omega' t}$ let the interval be (t_0, t_0+T) | 7M | C01 | BL 2 |
| | b) | Explain the operations on signals, time delay/advance, time folding and time scaling. | 7M | C01 | BL 1 |
| 3 | a) | Determine the Fourier Transform of standard signals Unit Impulse function, Signum function and Unit Step function | 7M | C02 | BL 2 |
| | b) | Find the exponential Fourier series of the signal $x(t) = 5\cos 5t + 10 \sin 15t$. | 7M | C02 | BL 2 |
| 4 | a) | What is the overall impulse response $h(n)$ when two system with impulse response $h_1(n)$ and $h_2(n)$ are connected in parallel and in series? | 7M | C03 | BL 3 |
| | b) | Determine the convolution of the signals $X(n)=\{2,-1,3,2\}$ and $h(n)=\{1,-1,1,1\}$ | 7M | C03 | BL 3 |
| 5 | a) | Describe about the Hilbert Transform and express its properties. | 7M | C02 | BL 4 |
| | b) | Discuss the ideal filter characteristics of Low pass. Band pass and Band stop. | 7M | C03 | BL 3 |
| 6 | a) | Compute the Laplace transform of $x(t) = e^{-b t }$ for the cases of $b < 0$ and $b > 0$. | 7M | C04 | BL 4 |
| | b) | Determine the Z-transform and sketch the pole zero plot with the ROC for the following Signal: $x(n) = 0.5nu(n) - \frac{1}{3}nu(n)$. | 7M | C04 | BL 4 |
| 7 | a) | Derive relationship between z and Laplace Transform and describe about the stability. | 7M | C04 | BL 4 |
| | b) | Find the correlation of symmetrical gate pulse with amplitude and time duration '1' with itself. | 7M | C05 | BL 3 |
| 8 | a) | State and prove sampling theorem for low pass band limited signal and explain the process of reconstruction of the signal from its samples. | 7M | C05 | BL 1 |
| | b) | Discuss and Prove Properties of auto correlation function. | 7M | C05 | BL 2 |

