Exam. Code: 0927
Sub. Code: 6898

1129

B.E. (Electronics and Communication Engineering)
Third Semester
EC-302: Signal and Systems

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.

x-x-x

I. Answer the following:-

a) How is the function $\sin(\pi u)/\pi u$ denoted?

b) What is the unit step response of an LTI system with impulse response $h(n) = \delta(n) - \delta(n-1)$?

c) What is the region of convergence of the signal $x(n) = \{1, 2, 8, 4, 6\}$ in its z-transform?

d) Explain the time-reversal property of Z-transform

e) What is an anti-aliasing filter? (5x2)

UNIT – I

II. Determine the energy and power of the following signals:

a) $x(t) = e^{j(2t+\pi/4)}$

b) $x[n] = \text{Cos}(\pi/4n)$

III. a) Find whether the following system is memory-less, time-invariant, linear, causal and stable. Justify your answer. $Y[n] = x[n] \sum_{k=-\infty}^{\infty} \delta[n-2k]$.

b) Explain how sampling shifts the frequency spectrum of signal. What is aliasing and how can it be avoided in sampled signals? (2x5)

IV. The unit impulse response of an LTI system is $h(t) = [u(t-3) - u(t-5)]$. Find the system's zero state response $y(t)$ if the input signal is $x(t) = e^{-3t} u(t)$. (10)

UNIT – II

V. a) Find the signal $x(n)$, whose one period of the DTPS coefficients are given by $X_k = (1/2)^k$, $0 \leq k \leq 9$.

P.T.O.

b) Determine all possible signals having z-transform

$$X(z) = \frac{1}{1 - 1.5z^{-1} + 0.5z^{-2}}$$

VI. Consider a causal LTI system with frequency response H(w) = 1/(3+jw). For a particular input x(t), this system is observed to produce the output $y(t) = e^{-3t} - e^{-4t} u(t)$. Determine x(t). (10)

VII. What is a state transition matrix and what is its role in state space analysis? Explain with an example. (10)

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