AJEENKYA
D Y PATIL UNIVERSITY

End Term Examination (December 2018)

School: School of Engineering Program: B.Tech (Mechatronics Engineering)
Course: Digital Signal Processing Course Code: MTE303
Semester: V Max Marks: 40 Duration (mins) : 120

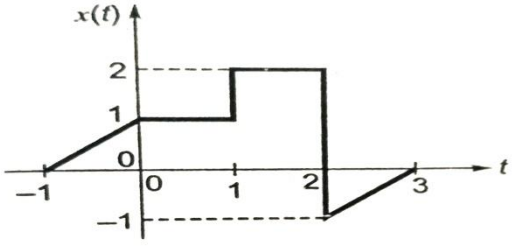
PART-A
(Write Very Short / One Line Answer)
Note: Answer all questions. Each question carries 1 mark. [10]

1. What is signal?
2. Write the general expression of laplace transform.
3. Define δ(t).
4. Write the general expression of z-transform.
5. Write the various properties of δ(t).
6. Draw and explain the ramp signal in discrete domain
7. What are various filters used in digital signal processing.
8. Write the general expression of fourier transform.
9. Explain causal signal.
10. Explain time scaling properties.

PART-B
(Short Answer Questions – Not More Than 150 Words)

Note: Answer any four questions. Each question carries 5 marks. [20]

11. If a plot of a signal x(t) is as shown in figure, then plot of the signal x(1-t) , x(2/3t-1) .



12. Evaluate the following integrals:

(a) $\int_{-1}^{1}(3t^2+1)\delta(t)\,dt$ **(b)** $\int_{1}^{2}(3t^2+1)\delta(t)\,dt$ **(c)** $\int_{-\infty}^{\infty}(t^2+cos\pi t)\delta(t-1)\,dt$
(d) $\int_{-\infty}^{\infty}e^{-t}\,\delta(2t-2)\,dt$ **(e)** $\int_{-\infty}^{\infty}e^{-t}\delta\,(t)\,dt$

13. A voltage is expressed as V(s) = $\frac{(s+1)}{(s^2+4s+4)}$ if this voltage is applied across a resistance of 0.25 Ω only, find the current through resistor in time domain.

14. Check whether the following signals are periodic. If they are, find their fundamental period.
    (a) X(n)=2sin 0.8 πn (b) x(n)= 3cos 4n
15. Find the response of FIR filter with impulse response h(n) = $\{1,2,4\}$ to input sequence x(n)= $\{1,2\}$.
16. Use the backward difference for the derivative and convert the analog filter with system function. H(s) = $\frac{1}{s^2+16}$.

PART-C

(Long/Case Study/Essay Type Answer Questions)

Note: Answer any one question. Each question carries 10 marks. [10]

17. Using the residue method, find the inverse z-transform of X(z) = $\frac{1}{(z-0.25)(z-0.5)}$
18. A low pass filter is to be designed with the following desired frequency response

    $H_d(e^{j\omega}) = \begin{cases} e^{-j2\omega} & , -\pi/4 \le \omega \le \pi/4 \\ 0 & \frac{\pi}{4} < \omega \le \pi \end{cases}$

    Determine the filter coefficients $h_d(n)$ if the window function is defined as

    $\omega(n) = \begin{cases} 1 & , 0 \le n \le 4 \\ 0 & , \ otherwise \end{cases}$

    Also , determine the frequency response of $H(e^{j\omega})$ of the designed filter.