Reg. No. : .....

Name : .....

Fourth Semester B.Tech. Degree Examination, February 2015
(2008 Scheme)
08.403 – SIGNALS AND SYSTEMS (TA)
(Special Supplementary)

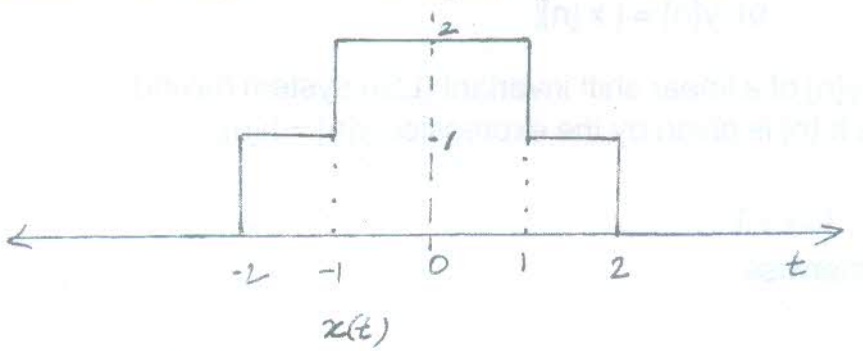
Time : 3 Hours Max.Marks : 100

PART – A

Answer **all** questions :

1. Determine the power of the signal x(t) = 10 sin st.

2.



fig(1)

Express the signal x(t) shown in figure (1) using the unit step function u(t).

3. Check whether the following discrete signals are periodic. Determine the period if the signal is periodic

a) $\cos 0.5\pi n$ b) $e^{j\frac{\pi}{3}n}$

4. Determine whether the discrete system represented by the impulse response given below is stable $h(n) = a^n u(n)$.

5. Show that the trigonometric Fourier series of an even periodic function f(t) consists of cosine terms only.

6. Compute the Fourier transform of the unit step function u(t).

P.T.O.

7. Compute the DTFT of the signal $x[n] = a^n \{u[n] - u[n-10]\}$.

8. Determine the Laplace transform and region of convergence of the function $x(t) = (e^{2t} - 2e^{-t})\, u(t)$.

9. Find the causal signal x[n] represented by the z transform $X(z) = \frac{z(2z-1)}{(z-1)(z+0.5)}$.

10. Show that z transform is linear. **(10×4=40 Marks)**

PART – B

Answer **any two** questions from **each** Module.

Module – I

11. Determine whether the following discrete time systems is linear, shift invariant, causal, stable and invertible. 10

    a) $y[n] = x[-n]$ b) $y[n] = |x[n]|$

12. Show that the output y[n] of a linear shift invariant (LSI) system having unit sample response h [n] is given by the expression $y[n] = h[n] * x[n]$. 10

13. Let $x(t) = \begin{cases} 1-|t|, \text{ for } -1 \le t \le 1 \\ 0, \quad \text{otherwise} \end{cases}$

    a) Find $x(t) * x(t)$. 4

    b) Sketch $x(-2t)$ and $x(2-t)$. 4

    c) Compute the energy of $x(2t)$. 2

Module – II

14. Consider a continuous time signal x (t) and its Fourier transform $X(e^{j\omega})$.

    a) Show that the energy of $X(e^{j\omega})$ is equal to the energy of x (t). 4

    b) If x (t) is a real signal, then $X(e^{j\omega})$ is even symmetric. 3

    c) If x (t) is even symmetric, then $X(e^{j\omega})$ is real. 3

15. State and prove sampling theorem for band-limited signals. 10

16. a) Show that Discrete Time Fourier Transform (DTFT) is periodic and linear. 4

    b) State and prove multiplication property of DTFT. 6

Module – III

17. a) Determine the z- transform of $x(n) = n^2 u(n)$. 5

    b) State and prove differentiation property of z-transform. 5

18. For a continuous time system with transfer function $H(s) = \frac{s+5}{s^2+5s+6}$, find the zero-state response for an input $x(t) = e^{-3t} u(t)$. 10

19. a) Define :

    i) Strict sense stationarity.

    ii) Wide sense stationarity.

    iii) Ergodicity. 6

    b) State Wiener-Khinchin theorem. 4