Hall Ticket Number:

Code No. : 21515

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (I.T.) II Year I-Semester (Main & Backlog) Examinations, Nov./Dec.-2016

Signals and Systems

Time: 3 hours Max. Marks: 70

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. Define Sinc function.
2. Differentiate convolution sum and convolution integral.
3. What are Eigen functions? Why they are called so? List two Eigen functions.
4. What is the condition for causality of an LTI system?
5. Define half-wave symmetry of a signal and plot it.
6. List the necessary and sufficient conditions for existence of Fourier transform of continuous time signals.
7. Distinguish between Laplace transform and Fourier transform.
8. State sampling theorem.
9. In frequency domain, compare continuous time Fourier transform and discrete time Fourier transform.
10. Define unilateral Z-transform and what are its applications?

Part-B (5 × 10 = 50 Marks)
(All bits carry equal marks)

11. a) Sketch the following signals.
    (i) $u\left(t+\frac{\tau}{2}\right)-u\left(t-\frac{\tau}{2}\right)$ (ii) $\pi\left(\frac{t-2}{4}\right)+\pi(t-2)$
    b) Find the convolution of two pulse signals whose magnitude is **A** centred at origin in the Interval **–T/2** and **T/2**.
12. a) State and prove the condition for stability of an LTI discrete time system.
    b) Find the response of the system, whose input is x(n) = { 1, 1,0, 1, 1} and impulse response h(n) = { 1, -2, -3, 4} and represent them graphically.
13. a) State and prove Parseval's relation for continuous time aperiodic signal.
    b) Find the Exponential Fourier series representation of a periodic unit magnitude pulse train of width τ and period T.
14. a) What is difference between sampling and quantization? Explain the effect of under sampling with necessary waveforms.
    b) Find the Laplace transform of $f(t) = t.\cosh(3t)$
15. a) Find the DTFT of the sequence $x(n) = \left(\frac{1}{3}\right)^{|n-3|} u(n-3)$
    b) Explain the properties of region of convergence of Z-transform.
16. a) Determine Whether the signal x(t) = 8 cos4t cos6t is energy signal or power signal. Find the corresponding energy or power.
    b) Prove that impulse response of cascade of two systems is convolution of their impulse response.
17. Answer any ***two*** of the following:
    a) Find the Fourier transform of $x(t) = te^{-at}u(t),\ a > 0$.
    b) Write a MATLAB program to locate poles and zeros in s-plane.
    c) State and prove initial and final value theorem of Z-transform.