Code :9A04304 **R9**

II B.Tech I Semester(R09) Supplementary Examinations, May 2011
SIGNALS & SYSTEMS
(Common to Electronics & Instrumentation Engineering, Electronics & Control Engineering, Electronics & Communication Engineering, Electronics & Computer Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE questions
All questions carry equal marks

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1. (a) Verify the following signals $\sin n\omega_0 t$ and $\sin m\omega_0 t$ are orthogonal or not over the interval $(t_0, t_0 + 2/\omega 0)$
   (b) Approximate the function described below by a wave form sin t over the interval $(0, 2\pi)$. The function is
   f(t) = 1 $0 < t < \pi$
   =-1 $\pi < t < 2\pi$
   Also sketch the original function and approximated function.
2. (a) Expand following function f(t) by trigonometric Fourier series over the interval (0,1). In this interval f(t) is expressed as f(t) = At
   (b) Prove that discrete magnitude spectrum is symmetrical about vertical axis whereas phase spectrum anti-symmetrical about vertical axis.
3. (a) Find the Fourier transform of symmetrical gate pulse and sketch the Spectrum
   (b) State and prove following properties of Fourier transform
      i. Time shifting
      ii. Differentiation time domain
4. (a) Derive the relationship between rise time and bandwidth
   (b) Sketch the frequency response of ideal LPF,HPF and BPF.
5. (a) State and frequency Convolution property of Fourier transform
   (b) Find the correlation of symmetrical gate pulse with amplitude and time duration '1' with itself.
   (c) Evaluate u(t) * u(t)
6. (a) Sketch the spectrum of naturally sampled signal for following cases
      i. $\omega_0 = 2\omega_m$
      ii. $\omega_0 > 2\omega_m$
      iii. $\omega_0 < 2\omega_m$
      Where 'ω_0' is frequency corresponding to sampling interval and 'ω_m'is maximum frequency in the spectrum of base band signal. Explain the each sketch.
   (b) Explain the reconstruction of signal from its samples.
7. (a) Find Laplace transforms and sketches their ROC of
      i. x(t) = u(t-5)
      ii. $x(t) = e_0^{jwt}\, u(t)$
   (b) Find the inverse Laplace transform of
   X(s) = (-5s-7)/(s+1)(s-1)(s+2)
8. (a) Determine z - transform, pole - zero locations and sketch of ROC of following signal
   X(n) = -u(-n-1)+$(1/2)^n$u(n)
   (b) Find the inverse z - transform of
   X(z) = (2+z^{-1})/(1-0.5z^{-1}) with ROC $|z| > 1/2$
   Using power series expansion

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