



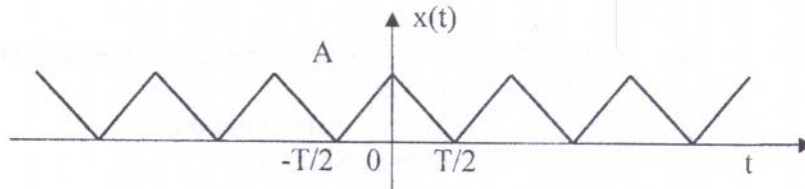
VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE
[Central Technological Institute, Maharashtra State]
(Autonomous, affiliated to Mumbai University)
Matunga, Mumbai-400 019

End SEMESTER EXAMINATION
SEMESTER & PROGRAM
TIME ALLOWED
COURSE (Course Code) :
May 2012
Sem. IV-B. Tech. EXTC
3 HRS.
SIGNALS & SYSTEM (ET0204)
DATE OF EXAM. 14/05/2012
TIME 1:30 to 4:30 pm.
MARKS 100

Instructions:-

- 1) All questions are compulsory.
- 2) All questions carry equal marks.
- 3) All sub-questions of a given question should be grouped & written together.

- Q.1.**
- a. State with justification, whether the following signals are periodic. Find the period in terms of T/N (as the case may be), If they are periodic.
i) $5\cos(4\pi t) + 3\sin(8\pi t)$
ii) $\cos 5.8\pi n + \sin 2.6\pi n$ 04
 - b. Find Laplace Transform of $e^{at}\cos(at)$ 04
 - c. Classify the following system as Time-variant/time invariant, linear/nonlinear, static/dynamic and stable/unstable
 $y(n) = x(n) \sin(\omega_0 n)$ 04
 - d. Find the Impulse Response of RL circuit 04
 - e. Find the Z Transform of $x(n) = -na^n u(-n-1)$ 04
- Q.2.**
- a. Determine the exponential form of the Fourier series representation of the signal in following fig. 10



- b. Determine the Fourier series representation of the following discrete time signal and sketch the frequency spectrum
 $x(n) = \{ \dots, 1, 2, -1, 1, 2, -1, 1, 2, -1, \dots \}$ 10

OR

- a. Perform Convolution of following signals, by graphical method. 10
 $X_1(t) = e^{-at}; 0 \leq t \leq T, \quad X_2(t) = 1; 0 \leq t \leq 2T$
- b. Determine The inverse Z Transform of $X(z) = \frac{1}{1-0.8z^{-1}+0.12z^{-2}}$ 10
For following different ROC
a) $|z| > 0.6$
b) $|z| < 0.2$
c) $0.2 < |z| < 0.6$
- Q.3. a. An LTI system is described by the difference equation 15
 $y(n) = ay(n-1) + bx(n)$. Find the impulse response magnitude function and phase function. Solve b, if $|H(e^{j\omega})| = 1$. Sketch the magnitude & phase response for $a=0.9$
- b. Determine the convolution of $x_1(t) = e^{-2t}u(t)$ and $x_2(t) = e^{-6t}u(t)$, using 05
Fourier Transform

OR

- Q.3. Define ESD & PSD for Continuous time and Discrete time signals. 20
Also give relation between input and output ESD & PSD of an LTI System for both continuous and discrete time signals.
- Q.4. a. Determine the response of LTI discrete time system governed by the 10
difference equation $y(n) - 2y(n-1) - 3y(n-2) = x(n) + 4x(n-1)$ for the input $x(n) = 2^n u(n)$ and with initial condition $y(-2) = 0, y(-1) = 5$
- b. i) If $X(s) = 2/(s+3)$. Find Laplace Transform of $dx(t)/dt$. 10
ii) If $X(s) = 0.4/(s+0.2)$. Find Laplace of $tx(t)$.
For both problems state the properties used of Laplace Transform
- Q.5. a. Explain Gibbs Phenomenon with one proper example. 05
- b. State and Prove following properties of Laplace Transform 15
i) Time Scaling
ii) Frequency differentiation
iii) Frequency Shifting

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