OKLAHOMA STATE UNIVERSITY

SCHOOL OF ELECTRICAL AND COMPUTER ENGINEERING

ECEN 3723 Systems I
Fall 2001
Final Exam

Choose any four out of five problems,
Please specify
1)_____; 2)_____; 3)_____; 4)_____;
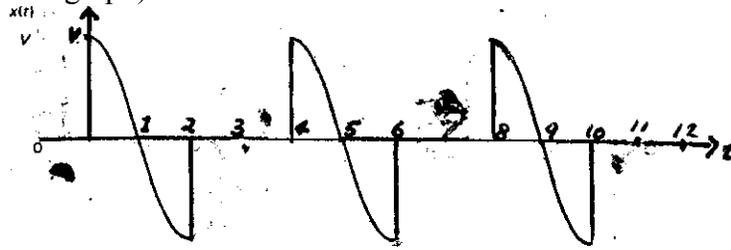
Name : _____

Student ID: _____

E-Mail Address:_____

Problem 1: (*Laplace Transform*)

Determine the Laplace transform of the following signal, $x(t)$, with five periods (only three periods are shown in the graph).
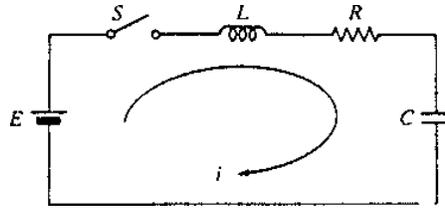
Problem 2: (*z Transform*)
Solve the following difference equation
$$(k+1)x(k+1) - kx(k) = k+1$$
where $x(k) = 0$ for $k \leq 0$.

Problem 3: (*Time Response*)

Given an electrical circuit shown below, the voltage source E is suddenly connected by means of switch S at $t = 0$. Assume that capacitor C is initially uncharged and that inductance L carries no initial current. What is the current $i(t)$ for $t > 0$?

Problem 4: (*Frequency Response*)
Consider the *stable* electrical circuit shown below. Assume that the input is sinusoidal,
$e_i(t) = E_1 \sin\omega_1 t + E_2 \cos\omega_2 t$, what is the steady state output voltage $e_o(t)$?
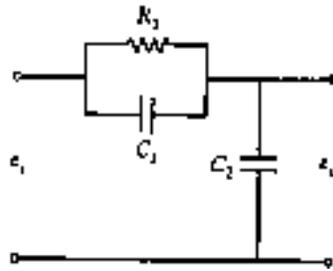
Problem 5: (*Transfer Function*)

The input $x(k) = 2u(k) - 2u(k-2) + u(k-4) - 2u(k-6) + u(k-7)$ is applied to a linear time-invariant discrete-time system. The resulting response with *no initial* energy is $y(k) = k^2 u(k) - k^2 u(k-5)$. Determine the transfer function $H(z)$ of the system.