**Some Practice Questions for Exam 1**

**Part I: Short Answer Questions**

1. $\int_{-\infty}^{\infty}(\tau^2+1)\delta(1-\tau)d\tau$ equals to

a) 0 b) -2 c) 3 d) 2

2. Given that $y(t)=\int_{-\infty}^{t}e^{2(t-\tau)}x(\tau-2)d\tau$ is a LTI system, its impulse response is:

a) $h(t)=e^{2(t-2)}u(t-2)$
b) $h(t)=e^{2(t+2)}u(t+2)$
c) $h(t)=e^{2(t+2)}u(t-2)$
d) $h(t)=e^{2(t-2)}u(t+2)$

3. Determine whether the following statements are true or false.

a) The product of an even and an odd function is even.

b) $x(t)=\cos(4t+30)$ is periodic with period π seconds.

c) $x(t)=\cos(t)u(t)$ is a power signal.

d) $y(t)=x(3t)$ is time-invariant.

4. The system $y(t)=\int_{-\infty}^{\infty}x(\tau)u(\frac{\tau-t}{2})d\tau$ is

a) time-varying
b) non-causal
c) BIBO stable
d) None of these

5. The inverse Laplace transform of $1-\frac{s}{s+3}$ is

a) $\delta(t)-e^{-3t}u(t)$
b) $3e^{-3t}u(t)$
c) $\delta(t)-3e^{-3t}u(t)$
d) $e^{-3t}u(t)$

**Part II- Long Answer Questions**

**1.** For a LTI system, it is known that when the input to the zero-state system is the unit step function the output is $y(t)=(1-e^{-t})u(t)$.

a) Find the impulse response of the whole system using Laplace transform.
b) Find the impulse response of the whole system in the time domain.
c) Find the response of the system to $x(t)=tu(t)$.

**2.** Consider the Circuit 2 in question 4.29 from the book.

a) Find the zero-state response to $x(t)=2\cos(4t)$, assume $R=2\Omega, C=1F$.
b) Find the transient and the steady-state responses.
c) Find the zero-input response assuming $y(0)=2$