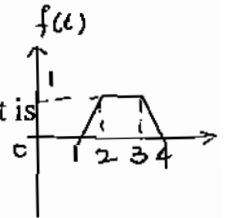


MAJOR EEL205

Marks 40

- It is an open book Exam.
- Extra Credit will be given if you solve it in less number of steps.

1. Find the Fourier transform of $f(t) = |\cos(t)|$.
2. For an LTI system, if the input is $u(t)$, output is $t e^{-t} u(t)$ Find output when input is
3. What is $x(t)$ if $L\{e^{-t+2} u(t-5) * x(t)\} = \frac{e^{-5s-3}}{(s+1)(s^2+1)}$



4. Find z-transform of $\left(\frac{-1}{2}\right)^{2n-2} u(n-1)$.

5. A system is described by the ODE $\ddot{y}(t) - 4\dot{y}(t) + 4y(t) = x(t)$

Find the solution if the input is $e^{-t} u(t)$, with initial conditions as $x(0)=0$ and $\dot{y}(0) = 4$

6. Consider a system described by

$$\text{system1: } w(t) = \int_{t-2}^t x(\tau) d\tau \quad \text{system2: } y(t) = \int_{t-4}^{t+4} w(\tau) d\tau$$

- (a) Is the overall system linear? Substantiate your answer.
- (b) Is the overall system time-invariant? Substantiate your answer.
- (c) Determine and plot the impulse response of the overall system.
- (d) Is the overall system causal? Substantiate your answer.
- (e) Is the overall system stable? Substantiate your answer.
- (f) If input is $t(u(t) - u(t-2))$, find output, and the Fourier transform of input and output.

7. Find $H(z)$

