

JK Lakshmi Pat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY
 End Term Examination, April 2024
 B. Tech. (CCE), Semester IV, 2023-2024

Roll No.....

EE1105: Signals and Control Systems

Time: 3 hours

Max. Marks: 30

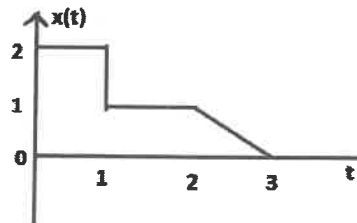
Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Mention all the assumptions for your answers clearly.

Material Required: Semi log graph paper.

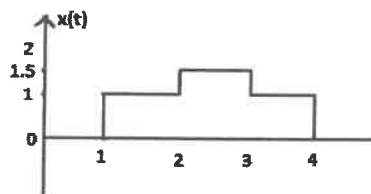
- Q. 1 If $x(t)$ is given as below and $h(t) = x(-t + 3)$, evaluate the graphical convolution of $x(t)$ and $h(t)$.

4.0
(LO1)



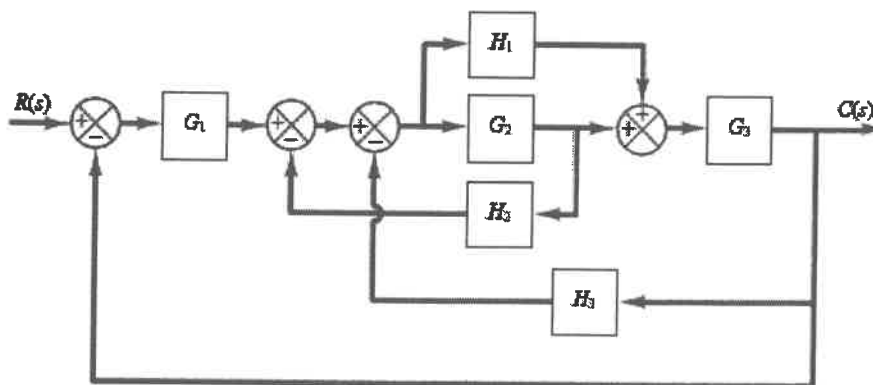
- Q. 2 Find Fourier transform of transform of the $x(t)$ show in below figure.

4.0
(LO2)



- Q. 3 Convert the following block diagram into its equivalent signal flow graph and obtain the transfer function.

4.0
(LO3)



- Q. 4 For the following polynomials, determine the number of roots are lie in left half of s -plane, right of s -plane and on the imaginary axis. Also comment on stability.

5.0
(LO5)

(a) $10s^4 + 9s^3 + 3s^2 + 6s + 9$

(b) $s^5 + s^4 + 2s^3 + 2s^2 + 11s + 10$

(c) $s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16$

- Q. 5 A unity feedback control system has the following forward path transfer function.

$$G(s) = \frac{20}{s(s + 10)}$$

4.0
(LO4)

Find the static error constants and steady state error of the system when subjected to an input given by the polynomial

$$r(t) = P_0 + P_1 t + \frac{P_2}{2} t^2$$

- Q. 6 Sketch the root locus of unity feedback system with an open loop transfer function as K varied from 0 to ∞ .

4.0
(LO6)

$$G(s) = \frac{K}{s(s + 2)(s + 3)}$$

Also determine:

- (a) The break away point
- (b) Intersection point of asymptotes.
- (b) Angles of asymptotes
- (d) The stability condition.

- Q. 7 A feedback system has loop function.

$$G(s)H(s) = \frac{1}{s(s + 3)(s + 4)}$$

5.0
(LO6)

Draw its Bode plot and calculate:

- (a) Gain cross over frequency.
- (b) Phase cross over frequency.
- (c) Gain margin (GM).
- (d) Phase margin (PM).

all the best!