JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- MAY-2023

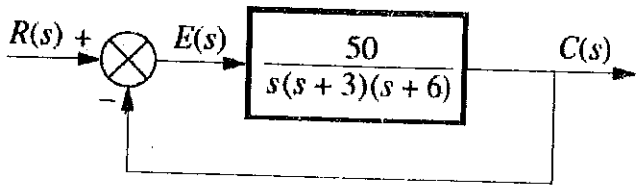
COURSE CODE (CREDITS): 18B11EC311(3) MAX. MARKS: 35

COURSE NAME: Automatic Control Systems

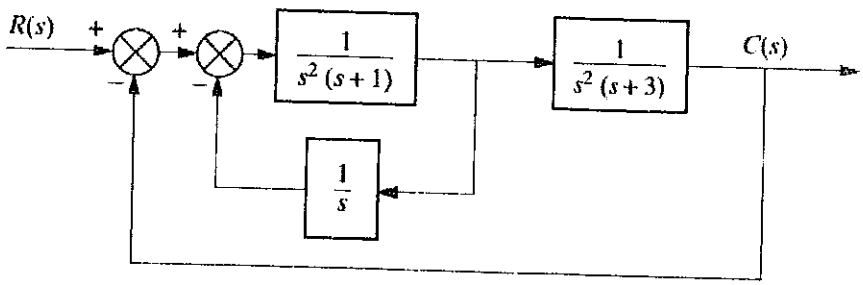
COURSE INSTRUCTORS: Dr. S R Talluri MAX. TIME: 2 Hours

***Note:*** *All questions are compulsory. Each question carries five marks*

1. Draw the Bode plot on the semi-log graph sheet for the system shown below. Obtain the gain cross over frequency and phase cross over frequency from the graphs that you have plotted. [CO-5]

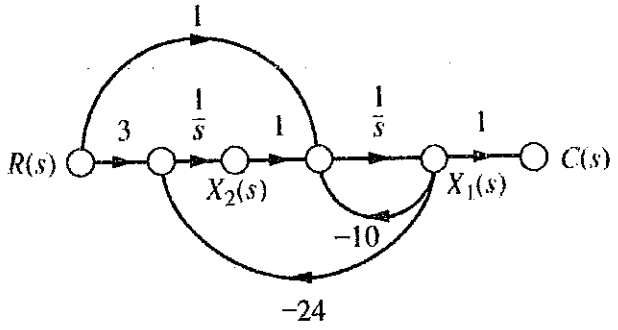



2. Draw the root locus (no need to use graph sheet) for a system with open loop transfer function $G(s)H(s) = \frac{K(s+2)}{(s+3)(s^2+2s+2)}$. Find the value of K at which system becomes marginally stable. [CO-5]
3. Given the system below, find the following: (a) The closed-loop transfer function (b) The system type (c) The steady-state error for an input of 5u(t) (d) The steady-state error for an input of 5tu(t) [CO-4]



4. Given the unity feedback system with transfer function, $G(s) = \frac{8}{s(s^6-2s^5-s^4+2s^3+4s^2-8s-s)}$ tell how many closed-loop poles are located in the right half-plane, in the left half-plane, and on the jω-axis. [CO-4]

5. Using Mason's rule, find the transfer function, , $T(s) = \frac{C(s)}{R(s)}$ for the system represented below. [CO-3]




6. Find the transfer function of a second-order system that yields a 15% overshoot and a settling time of 0.7 second. Draw the pole zero plot of the system that you have obtained. [CO-3]

7. What do you mean by state-space representation? Find the state equations and output equation for the phase-variable representation of the transfer function $G(s) = \frac{2s+1}{(s^2+7s+9)}$ [CO-2]