

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA
Electrical & Instrumentation Engg.
Special Examination BE

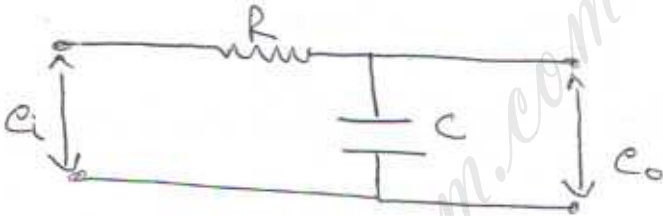
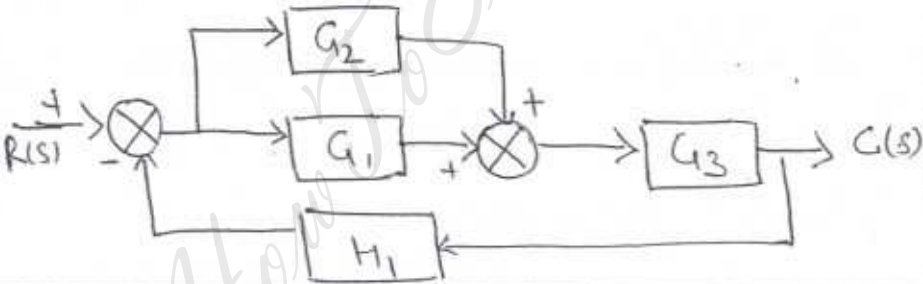
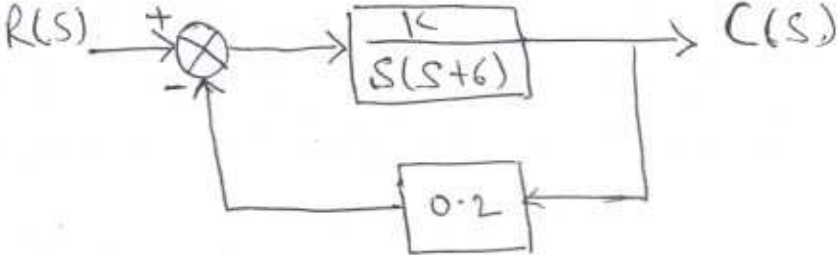
Max Marks: 50

Time allowed: 3 Hrs.

Examiner: Nirbhaw Jap Singh

EI- 003 (Control System)

- Note:
1. Attempt five questions in all.
 2. Assume suitable data if required.
 3. All notations/characters carry their usual meanings.
 4. All the parts of one question must be done at one place.
 5. Over attempted questions will not be evaluated.

<p>Q.1) a.</p>	<p>Find the transfer function of R/C network shown below</p> 	<p>(5)</p>
<p>b.</p>	<p>Reduce the block diagram shown below</p> 	<p>(5)</p>
<p>Q.2) a.</p>	<p>Obtain the time response of first order control system when subjected to step input. The transfer function of first order system is $1/1 + \tau s$</p>	<p>(5)</p>
<p>b.</p>	<p>A closed loop control system is shown below. Determine the value of K for the system is to have damping ratio of 0.7. Calculate the settling time, peak time and max over shoot for the system.</p> 	<p>(5)</p>

Q.3) a.	Determine the stability of the system whose overall transfer function is give by $C(s)/R(s) = (2s+5) / (s^5 + 1.5 s^4 + 2 s^3 + 4 s^2 + 5 s + 10)$	(5)
b.	Determine the following terms and explain there effects on stability i. Gain Margin ii. Phase Margin iii. Pole iv. Zero	(5)
Q.4) a.	What are the silent features of Root Locus plot	(5)
b.	Verify the controllability of system if $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -2 & -3 \end{bmatrix} \quad B = \begin{bmatrix} 0 & 1 \\ 0 & 0 \\ 1 & 1 \end{bmatrix}$	(5)
Q.5).	Sketch the Root Locus for the open loop transfer function of unity feed back system given below $G(s) = K / (s(s+1)(s+3))$ Find the value of K i. For $\zeta = 0.5$ ii. Margin stability iii. At $S = -4$	(10)
Q. 6)	Draw the bode plot for the transfer function given below: $G(s) H(s) = 48(s+10) / s(s+20) (s^2 + 2.4 s + 16)$ Find the gain margin and phase margin.	(10)