Code No: 154AK

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester (Special) Examinations, January/February - 2021
CONTROL SYSTEMS
(Electrical and Electronics Engineering)

Time: 2 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1. Find the transfer function $\theta(s)/T(s)$ for the figure 1 given below. [15]

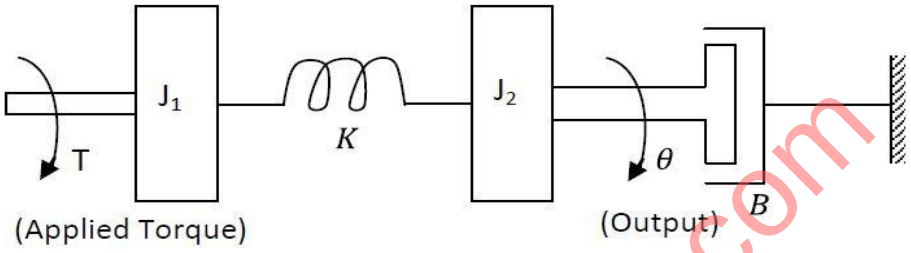

Figure: 1

2. Using block diagram reduction technique, obtain closed loop transfer function of the figure 2 give below. [15]

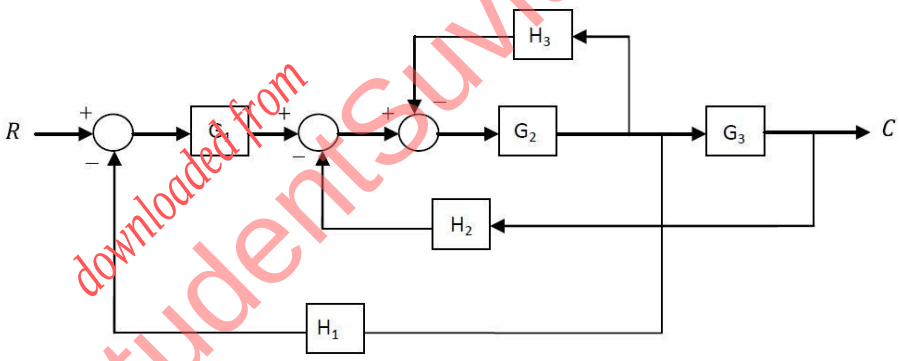

Figure: 2

3. A unity feedback system has a forward path transfer function $G(s)\frac{10}{s(s+2)}$. Find the value of damping ratio, undamped natural frequency of the system, percentage over shoot, peak time and settling time. [15]

4.a) Explain the Routh's criteria with an example.

b) A system has $G(s)H(s)=\frac{K}{s(s+2)(s+4)(s+8)}$, where K is positive. Determine the range of K for stability. [7+8]

5. A unity feedback control system has an open loop transfer function given by $G(s)H(s) = \frac{10}{s(s+3)(s+6)}$.
Draw Nyquist diagram and determine its stability. [15]

6. Sketch the polar plot and discuss the stability of the system represented by $G(s)H(s) = \frac{K}{s(s+1)(s+5)}$. [15]

7. Explain the design procedure of lag compensator. [15]

8. Write short notes on the following:
a) Controllability and observability
b) State Transition matrix
c) Diagonalization. [5+5+5]

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