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Code No: EC1524

GEC-R14

II B. Tech II Semester Supplementary Examinations, December 2017

CONTROL SYSTEMS

(Electronics and Communication Engineering)

Time: 3 Hours

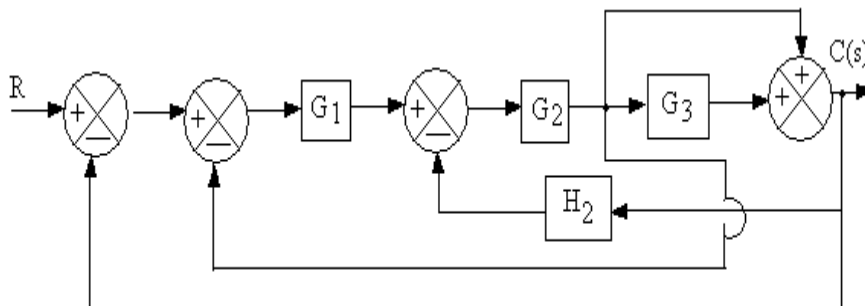
Max. Marks: 60

Note: All Questions from **PART-A** are to be answered at one place.Answer any **FOUR** questions from **PART-B**. All Questions carry equal Marks.**PART-A****6 × 2 = 12M**

1. Write the torque balance equations for an ideal inertia, ideal spring and ideal dashpot of a rotational system.
2. What is the effect of PI controller on the system performance?
3. What do you mean by a centroid with respect to root locus? Write down the formula to calculate it.
4. Define gain cross over frequency and phase cross over frequency.
5. What are the advantages of state space approach?
6. What are the advantages and disadvantages of digital control systems?

PART-B**4 × 12 = 48M**

1. a) Obtain the transfer function for the figure shown below: (6M)



- b) Clearly explain the differences between open loop and closed control system. (6M)
- a) Derive the expressions for peak time, peak over shoot, rise time and settling time of a second order system subjected to step input. (8M)
- b) For control system with open loop transfer function $G(s) = \frac{20}{(s+1)(s+4)}$, find out k_p , k_v , k_a and steady state error for step input. (4M)
3. Sketch the complete root locus of system having $G(s)H(s) = \frac{k}{s(s+1)(s+2)(s+3)}$. (12M)

4. For a unity feedback system $G(s) = \frac{800(s+2)}{s^2(s+10)(s+40)}$. Sketch the Bode plot and comment on stability. (12M)
5. a) Evaluate the observability of the system with $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & -2 & -3 \end{bmatrix}$, $B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$ and $C = [3 \ 4 \ 1]$. (8M)
- b) Write down all the properties of state transition matrix. (4M)
6. Develop a mathematical model of sample and hold circuit. Show that an ideal sampler is impulse modulator. (12M)
