Code: R7220402

R07

B.Tech II Year II Semester (R07) Supplementary Examinations December/January 2015/2016
CONTROL SYSTEMS
(Common to EEE, ECE, E.Con.E & ECC)
(For 2008 regular admitted batch only)

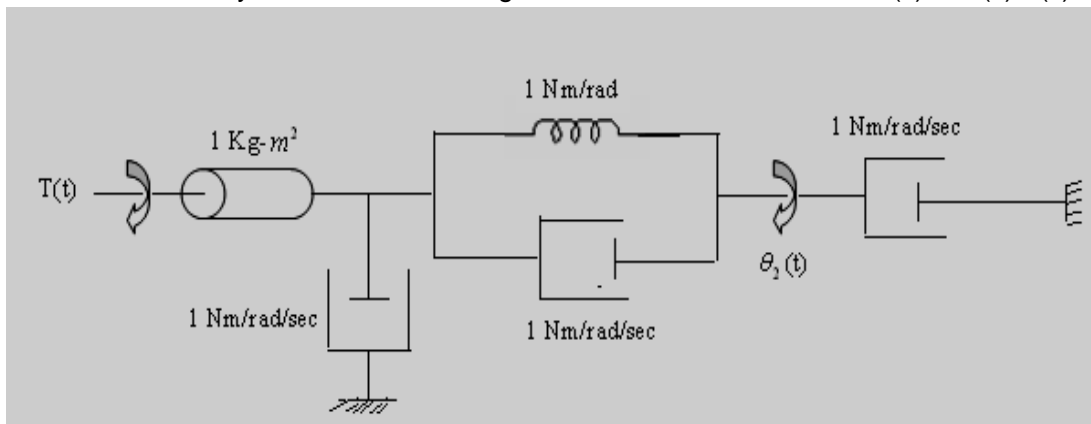Time: 3 hours   Max. Marks: 80

Answer any FIVE questions
All questions carry equal marks
(Polar graph may be issued)
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1   For the rotational system shown in the figure find the transfer function $G(s) = \theta_2(s)/T(s)$

2   Write short notes on the following:
  (a)   Field controlled dc motor.
  (b)   Armature controlled dc motor.

3 (a)   Derive the unit step response of a second order system.
  (b)   Find the steady state error for unit step, unit ramp and unit parabolic inputs for the following system:
        $G(s) = 10/[s(0.1s+1)(0.5s+1)]$

4   Sketch the root locus for the unity feedback system whose open loop transfer function is:
      $G(s)H(s) = K/(s(s + 4)(s^2 + 4s + 10))$

5   Draw the Bode plot and find the gain margin, phase margin of a system represented by a transfer function: $G(s) = [75(1 + 0.2s)]/[s(s^2 + 16s + 100)]$.

6 (a)   Explain the use of Nyquist stability criterion in the assessment of relative stability of a system.
  (b)   How do you select a Nyquist contour when there are poles on the imaginary axis in stability analysis of a given system?

7 (a)   Explain the need for lead-lag compensation and obtain the transfer function of lead-lag compensator.
  (b)   Draw the frequency response of lag, lead and lead-lag compensators

8   Determine the canonical state model of the system whose transfer function is:

$$\frac{Y(s)}{U(s)} = \frac{2(s+5)}{(s+2)(s+3)(s+4)}$$ and give diagrammatic representation for state model.