Code No: NR220405 **NR**

II B.Tech II Semester Supplementary Examinations, April/May 2005
CONTROL SYSTEMS
(Common to Electronics & Communication Engineering,Electronics & Instrumentation Engineering,Electronics & Control Engineering and Electronics & Telematics)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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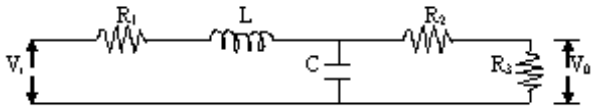
1. (a) Explain the advantages of signal flow graph representation over block diagram representation for a system.
   (b) Derive the transfer function of the following network given below.



2. (a) What is feedback? Explain the effects of feedback.
   (b) What is the sensitivity function and explain with respect to open loop and closed loop systems.

3. (a) What are the time response specifications? Explain each of them.
   (b) What are the standard test signals used to find time response of a system. Explain each of them.

4. A unity-feedback system is characterized by the open-loop transfer function $G(s) = \frac{1}{s(0.5s+1)(0.2s+1)}$. Determine the steady-state errors for unit-step, unit-ramp and unit-acceleration input. Also determine the damping ratio and natural frequency of the dominant roots.

5. A unity feed back system has open loop transfer function $\mathrm{G(S)} = \frac{K}{s(s^2+8s+32)}$. Sketch a root locus and find the dominant closed loop poles with $\xi = 0.5$. Find K at this point.

6. Draw the Bode plot for the system having $\mathrm{G(s)H(s)} = \frac{100(0.02s+1)}{(s+1)(0.1s+1)(0.01s+1)}$. Find gain and phase cross over frequency.

7. A unity feedback control system has an open loop transfer function given by $\mathrm{G(s)H(s)} = \frac{100}{s(s+5)(s+2)}$. Draw the Nyquist diagram and determine its stability.

8. A Feedback system has a closed loop transfer function. $\frac{C(S)}{4(S)} = \frac{10(s+4)}{S(S+1)(S+3)}$
   Construct the canonical state model and phase variable model to represent the above transfer function and obtain their block diagram representation.

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