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T.E. Electrical VI CBSGS

Q. P. Code: 18408

02.6.17

Time : 3 Hours

MAX. MARKS: 80

Note:

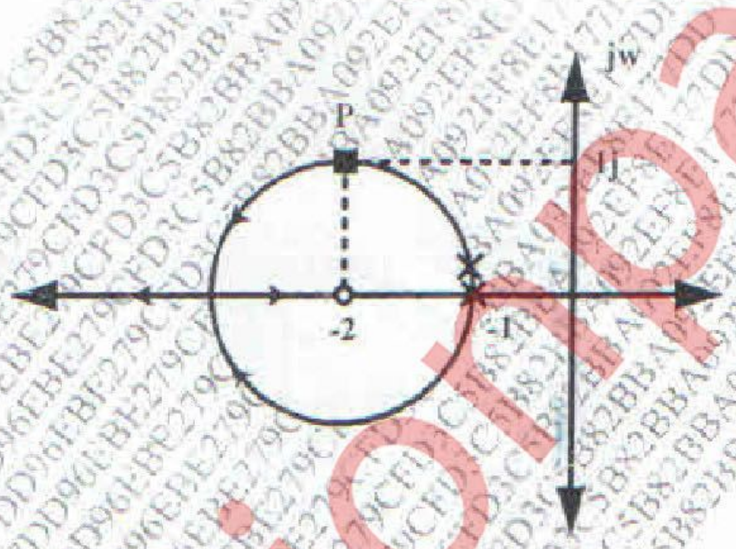
1) Question No. 1 is **compulsory**.
2) Attempt any **three** questions from remaining **five** questions.
3) Make suitable **assumption** wherever **necessary** and mention the same.
4) Use graph paper and semilog paper wherever necessary.
5) **Figures** to the **right** indicate **full** marks.

Q.1) A) State the difference between open loop system and closed loop system. **05 Marks**

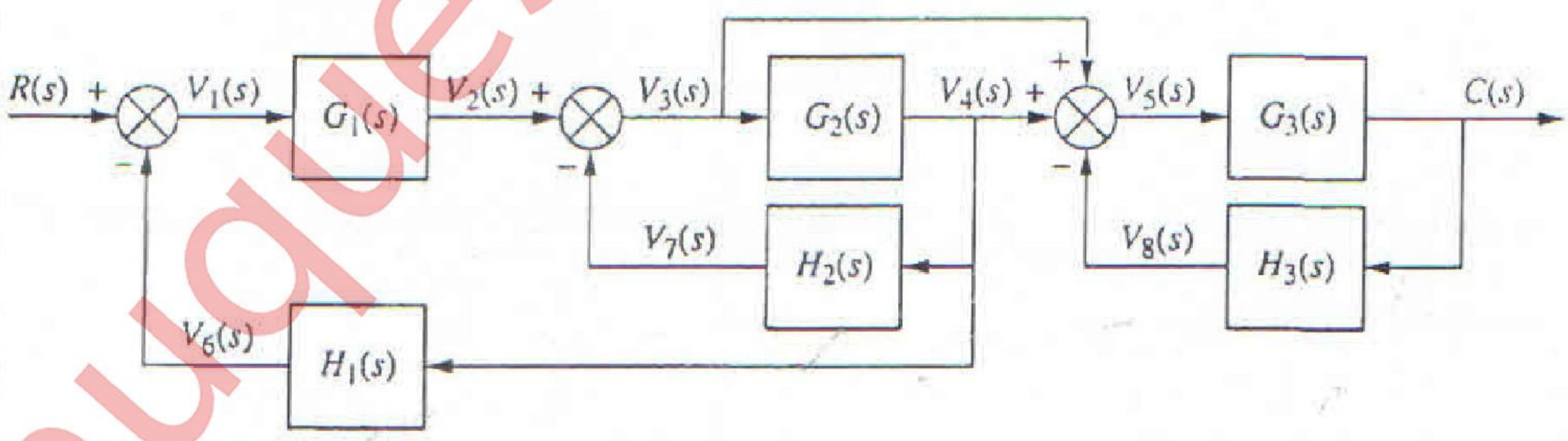
B) What are the advantages of using state space analysis over classical control approaches? **05 Marks**

C) Write a short note on transient response specifications. **05 Marks**

D) Calculate the value of gain K at point 'P' for root loci in figure. **05 Marks**



Q.2) A) Find overall transfer function of the given system using block diagram reduction method. **10 Marks**



Turn Over

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Q. P. Code: 1840

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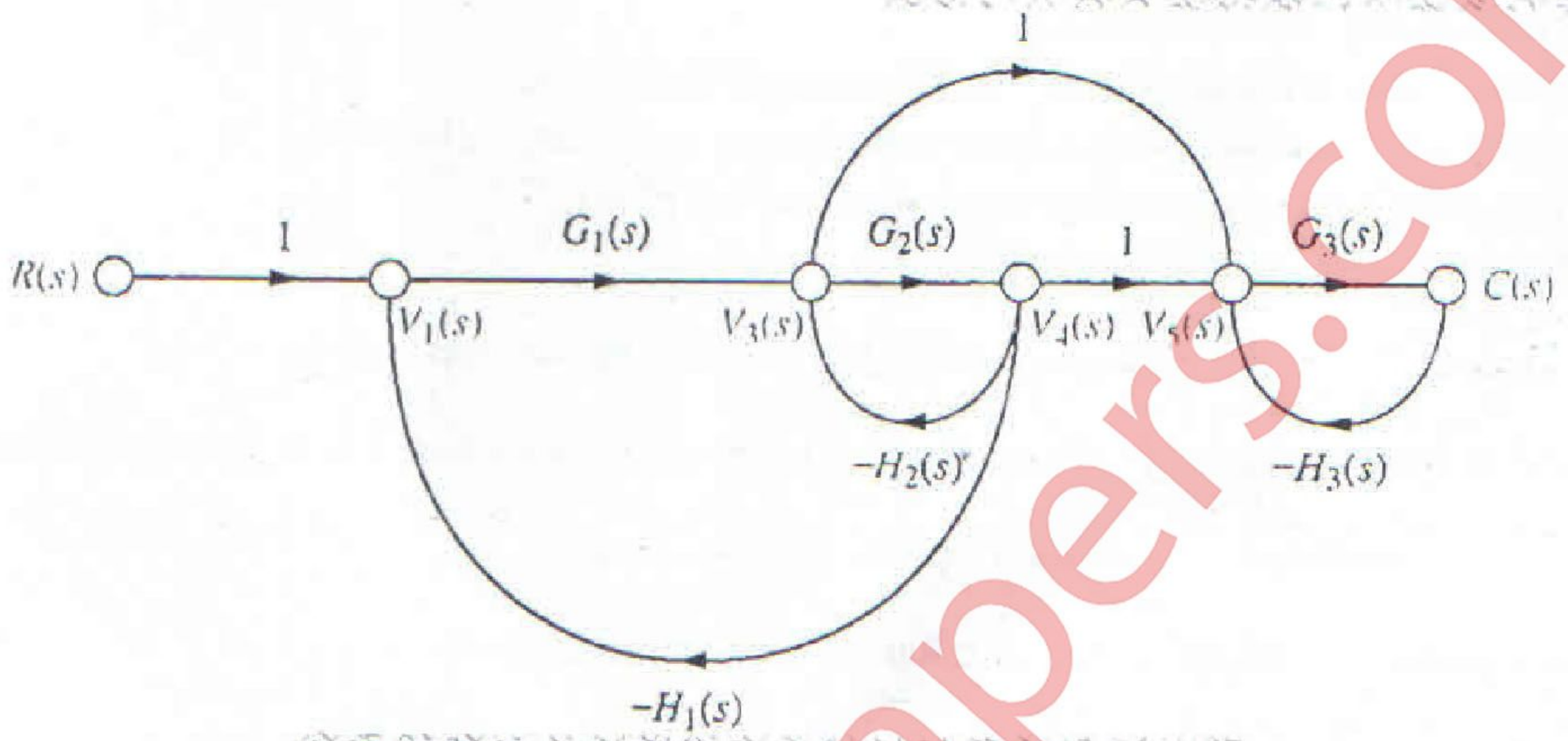
B) Find overall transfer function for the given signal-flow graph using mason's gain formula. **10 Marks**



Q.3) A) A system is given by differential equation, $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 8y = 8x$ where y is the output and x is the input. Determine all time domain specifications for unit step input. **10 Marks**

B) Sketch the complete root locus for the system having **10 Marks**

$$G(s)H(s) = \frac{K}{s(s+3)(s^2+3s+11.25)}$$

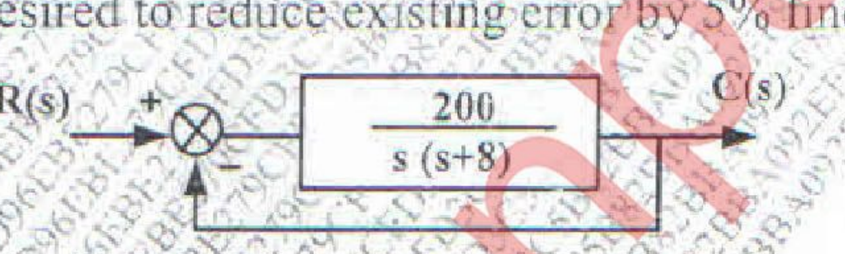
Q.4) A) Determine the poles and zeros of the following system. **10 Marks**

$$\dot{x} = \begin{bmatrix} 0 & 1 \\ -20 & -9 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} -17 & -5 \end{bmatrix} x + [1]u$$

B) Given a system $\frac{C(s)}{R(s)} = \frac{(s+3)}{(s^2+10s+24)}$ represent in parallel form and controller canonical form of state space representation. **05 Marks**

C) Find the value of K_{marg} by using Routh - Hurwitz criterion for the system shown below. 05 Marks



Q.5) A) Draw the bode plot and determine gain margin and phase margin for the system having 10 Marks

$$G(s)H(s) = \frac{e^{-0.2s}}{s(s+1)}$$

B) Draw the nyquist plot and comment on stability for the system having 10 Marks

$$G(s)H(s) = \frac{4(s-1)}{(s+2)}$$

Q.6) A) Determine the steady state error for system given below, where R(s) is the ramp input of magnitude 2. If it is desired to reduce existing error by 5% find new value of gain of the system. 07 Marks

B) Explain how to calculate static error constants from Bode magnitude plot. 07 Marks

C) Write a short note on AC servomotor. 06 Marks
