Reg. No. :

Question Paper Code : 52445

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Fourth Semester

Electronics and Communication Engineering

EC 2255 – CONTROL SYSTEMS

(Regulations 2008)

[Common to PTEC 2255 – Control Systems for BE (Part-Time) Fourth Semester – ECE – Regulations 2009]

Time : Three Hours

Maximum : 100 Marks

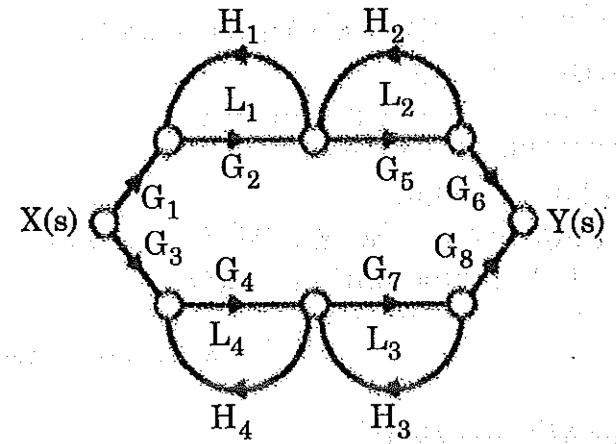
Answer ALL questions

PART – A (10×2=20 Marks)

1. Define transfer function.
2. List the advantages and disadvantages of feedback systems.
3. Define order of a system.
4. What are the standard test signals employed for time domain studies ?
5. Define phase margin.
6. Write short notes on the correlation between the time and frequency response.
7. State Routh's criterion for stability.
8. The addition of a pole will make a system more stable. Justify your answer.
9. What is quantization ?
10. What is controllability ?

PART – B **(5×16=80 Marks)**

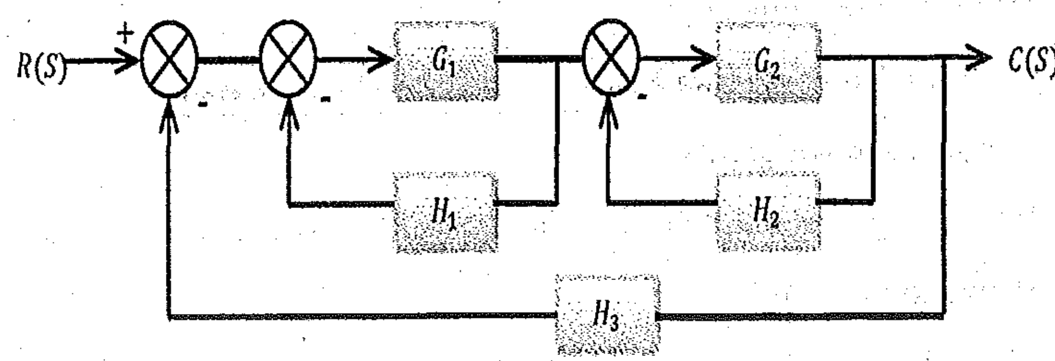
11. a) Find the Transfer Function Y(s)/X(s) using signal flow graph. **(16)**



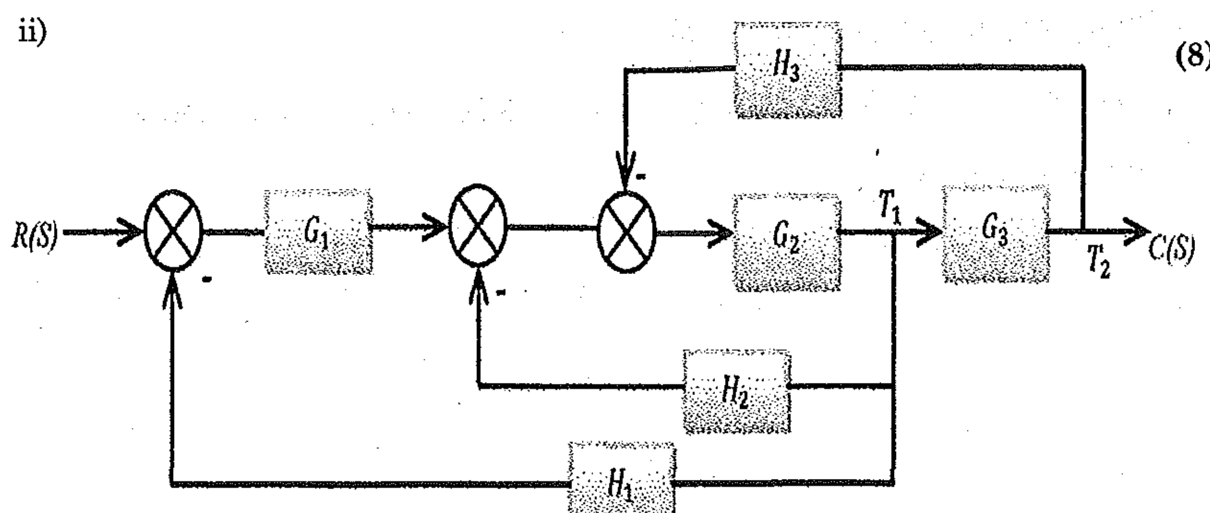
(OR)

b) Reduce the Block Diagram shown below :

i) **(8)**



ii) **(8)**



12. a) Obtain the step response of a second order system and its time domain specifications for an under damped case.

(OR)

b) Write notes on PI and PID controllers with neat sketches.

13. a) Draw the Bode diagram for the transfer function :

$$H(s) = -100\frac{s}{s^3 + 12s^2 + 21s + 10}.$$

(OR)

b) Explain the step by step procedure to design a lead compensator.

14. a) Sketch the root locus for the system defined by the transfer function $G(s) = K/[s(s+4)(s+2)]$.

(OR)

b) Plot the Nyquist diagram of the system $G(s) = 1/s(s+2)^2$ and determine the gain margin.

15. a) Check for the observability and controllability of the given system.

$$A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, C = \begin{bmatrix} 0 & 1 \end{bmatrix}$$

(OR)

b) Obtain the general expression to obtain the transfer function from state equation and hence obtain the transfer function for the system

$$A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, C = \begin{bmatrix} 0 & 1 \end{bmatrix}.$$

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