| O.P.Code: 18EE0211 | R18 | H.T.No. | | | | | | | | | | |
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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**

(AUTONOMOUS)

**B.Tech III Year I Semester Supplementary Examinations June-2024**

**CONTROL SYSTEMS**

**(Common to ECE & EEE)**

**Time: 3 Hours** **Max. Marks: 60**

**PART-A**

(Answer all the Questions **5 x 2 = 10** Marks)

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | Define transfer function. | CO1 | L1 | 2M |
| | b | List the time domain specifications. | CO2 | L1 | 2M |
| | c | What is the necessary condition for stability? | CO3 | L2 | 2M |
| | d | Define phase margine. | CO4 | L1 | 2M |
| | e | Write the formula for solutions of state equation. | CO5 | L2 | 2M |

**PART-B**

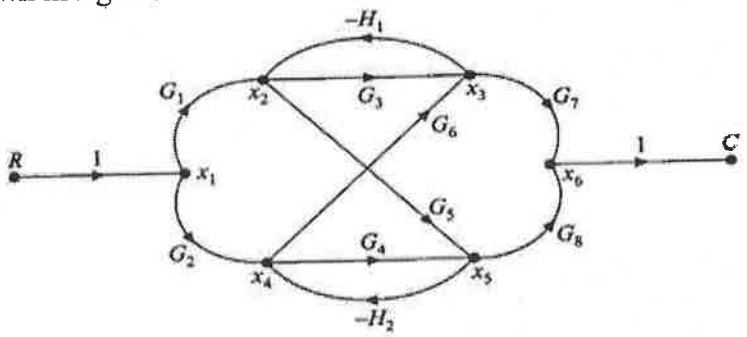
(Answer all Five Units 5 x 10 = 50 Marks)

**UNIT-I**

| | | | | | |
|---|---|---|---|---|---|
| 2 | a | Compare open loop and closed loop control systems based on different aspects? | CO1 | L3 | 5M |
| | b | List the properties of signal flow graph. | CO1 | L2 | 5M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 3 | | Using mason gain formula find the transfer function $\frac{C}{R}$ for the signal flow graph shown in figure. | CO1 | L4 | 10M |

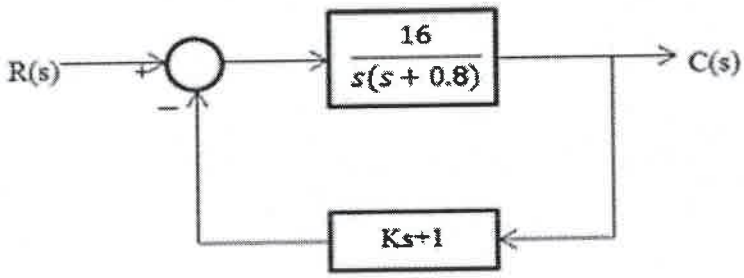



**UNIT-II**

| | | | | | |
|---|---|---|---|---|---|
| 4 | | Find all the time domain specifications for a unity feedback control system whose open loop transfer function is given by $G(S) = \frac{25}{S(S+5)}$. | CO2 | L3 | 10M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 5 | | A positional control system with velocity feedback shown in figure. What is the response c(t) to the unit step input. Given that damping ratio=0.5.Also determine rise time, peak time, maximum overshoot and settling time. | CO2 | L4 | 10M |



**UNIT-III**

| | | | | |
|---|---|---|---|---|
| 6 | The open loop transfer function of a unity feedback control system is given by $G(s)H(s) = \frac{K}{(S+2)(S+4)(S^2+6S+25)}$. Determine the value of K which will cause sustained oscillations in the closed loop system and what is the corresponding oscillation frequency. | CO3 | L4 | 10M |

**OR**

| | | | | |
|---|---|---|---|---|
| 7 | Sketch the root locus of the system whose open loop transfer function is $G(s)H(s) = \frac{K}{S(S+2)(S+4)}$ | CO3 | L3 | 10M |

**UNIT-IV**

| | | | | |
|---|---|---|---|---|
| 8 | A system is given by $G(s)H(s) = \frac{(4S+1)}{S^2(S+1)(2S+1)}$. Sketch the nyquist plot and determine the stability of the system. | CO4 | L3 | 10M |

**OR**

| | | | | |
|---|---|---|---|---|
| 9 | Obtain the transfer function of Lead Compensator, draw pole-zero plot and write the procedure for design of Lead Compensator using Bode plot. | CO4 | L3 | 10M |

**UNIT-V**

| | | | | |
|---|---|---|---|---|
| 10 | Obtain a state model for the system whose Transfer function is given by $G(s)H(s) = \frac{(7S^2+12S+8)}{(S^3+6S^2+11S+9)}$ | CO5 | L3 | 10M |

**OR**

| | | | | |
|---|---|---|---|---|
| 11 | Determine the Solution for Homogeneous and Non homogeneous State equations. | CO5 | L3 | 10M |

***** END *****