SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B. Tech III Year I Semester Regular Examinations December-2021
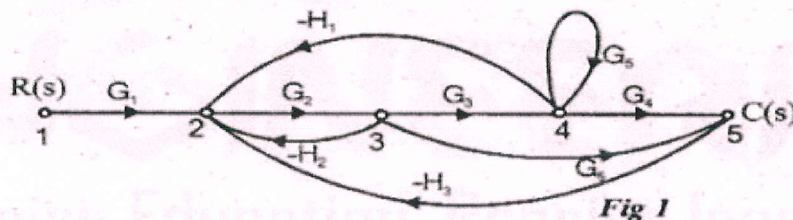### CONTROL SYSTEMS
(Common to EEE & ECE)

Time: 3 hours   Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	a	Compare open loop and closed loop control systems based on different aspects?	L4	8M
	b	Distinguish between Block diagram Reduction Technique and Signal Flow Graph?	L4	4M

OR

2   Obtain the overall gain C(S)/R(S) from signal flow graph shown in fig 1   L1   12M

Fig 1

UNIT-II

3   A unity feedback control system has an open loop transfer function, **G(s) = 10/S(S+2)** Find the rise time, percentage overshoot, peak time and settling time for a step input of 12 units   L1   12M

OR

4   Define steady state error? Derive the static error components for Type 0, Type 1 &Type 2 systems?   L1   12M

UNIT-III

5   With the help of Routh's stability criterion determine the stability of the following systems represented by the characteristic equations: L5   12M
(a) $s5 + s4 + 2s3 + 2s2 + 3s + 5 = 0$
(b) $9s5 - 20s4 + 10s3 - s2 - 9s - 10 = 0$

OR

6   Explain the procedure for constructing root locus.   L2   12M

UNIT-IV

7   Develop the Bode plot for the system having the following transfer function   L3   12M
$G(s)=15(S+5)/S(S^2+16S+10)$

OR

8   Draw the Nyquist plot for the system whose transfer function is $G(S)H(S)=K/S(S+2)$ (S+4), Determine the range of "K" for which closed loop system is stable.   L5   12M

UNIT-V

9	a	What are the properties of State Transition Matrix?	L1	4M
	b	Diagonalize the following system matrix.	L3	8M

$$A = \begin{pmatrix} 0 & 6 & -5 \\ 1 & 0 & 2 \\ 3 & 2 & 4 \end{pmatrix}$$

OR

10	a	Define state, state variable, state equation.	L1	6M
	b	Derive the expression for the transfer function from the state model.	L3	6M

$$X = Ax + Bu \text{ and } y = Cx + Du$$

*** END ***