

Roll No.:

SGT UNIVERSITY

END TERM THEORY EXAMINATION JULY-2022

Faculty/College of Study:	Engineering & Technology	Year/Semester:	6 th Semester
Program:	B.Tech. (ME)	Duration:	03:00 Hrs
Course/Subject:	Control System	Maximum Marks:	60
Course/Subject Code:	13030690	Batch:	2018

Instructions:-

1. Write Your Roll No. on the Question Paper.
2. Candidate should ensure that they have been provided correct question paper. Complaint(s) in this regard, if any should be made within 15 minutes of the commencement of the exam. No complaint(s) will be entertained thereafter.
3. All Questions are compulsory. Marks are indicated against each question.
4. Illustrate your answer with diagram wherever required.

SECTION-A

(Very Short Answer Type Questions)

Note: All Questions are compulsory: -

[12X1=12 Marks]

S. No.	Question	Marks Allotted
1	Define Transfer Function?	1
2	What is the advantage of a closed loop control system?	1
3	Define 'POLES' and 'ZEROS' in a transfer function.	1
4	State the Mason's gain formula.	1
5	What are different standard input test signals used for time domain analysis of a control system?	1
6	What is meant by characteristic equation?	1
7	Define Transient response analysis.	1
8	State one advantage and one disadvantage of frequency domain analysis method.	1
9	In Polar plots while specifying the angle and magnitude conditions, if angles are added then magnitudes get _____	1
10	What is the effect on root locus if a pole is added to the transfer function?	1
11	Define state variable.	1
12	Give one property of state transition matrix.	1

SECTION-D

(Long Answer Type Questions)

Note: All Questions are compulsory: -

[4X6=24 Marks]

S. No.	Question	Marks Allotted
21	<p>What is a signal flow graph? Use Mason's Gain formula to find the transfer function for the control system depicted by block diagram given below</p> <div style="text-align: center;"> </div>	6
22	<p>Derive the time response of second order system with unit step input and derive equation for rise time & maximum overshoot.</p> <p style="text-align: center;">OR</p> <p>A unity feedback system has a forward path transfer function</p> $G(s) = \frac{8}{s(s+2)}$ <p>Find the value of damping ratio, un-damped natural frequency of the system, percentage overshoot, peak time and settling time</p>	6
23	<p>A unity feedback control system has an open loop transfer function given by</p> $G(s)H(s) = \frac{20}{s(s+4)(s+5)}$ <p>Draw polar plot and determine stability.</p>	6
24	<p>Obtain the state space representation of an n^{th} order differential equation.</p> <p style="text-align: center;">OR</p> <p>The state variable formulation of a system is given by</p> $\dot{x} = \begin{bmatrix} -3 & 2 \\ -1 & 0 \end{bmatrix} x + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u,$ <p>and $y = [1 \ 0]x$</p> <p>Find the following:</p> <ol style="list-style-type: none"> Transfer function of the system State transition matrix and 	6