

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:	Instrumentation and Control Engineering	Maximum Marks:	60
Course/Subject Code:	13030603	Batch:	2017

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	What do you mean by Transfer Function?	1
2	State the Mason's gain formula.	1
3	Define 'POLES' and 'ZEROS' in a transfer function.	1
4	In Polar plots while specifying the angle and magnitude conditions, if angles are added then magnitudes get _____	1
5	What is steady state error?	1
6	State one advantage and one disadvantage of frequency domain analysis method.	1
7	Give names of a flow, displacement and force measuring instrument.	1
8	Name different instruments used to measure temperature.	1
9	What is a load cell?	1
10	How do we measure speed?	1
11	Define Accelerometer.	1
12	What do you mean by Dynamic characteristics of an instrument?	1

SECTION-B

(Short Answer Type Questions)

Note: All Questions are compulsory: -

[4X2=8 Marks]

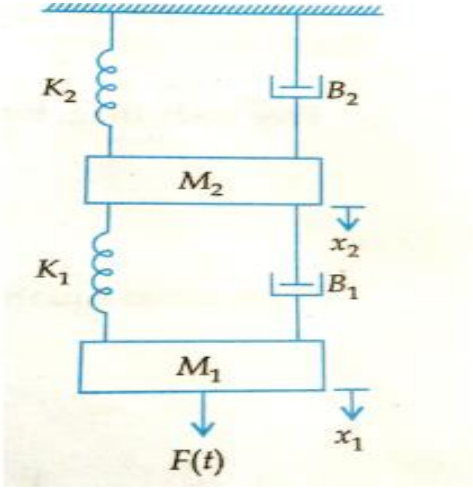
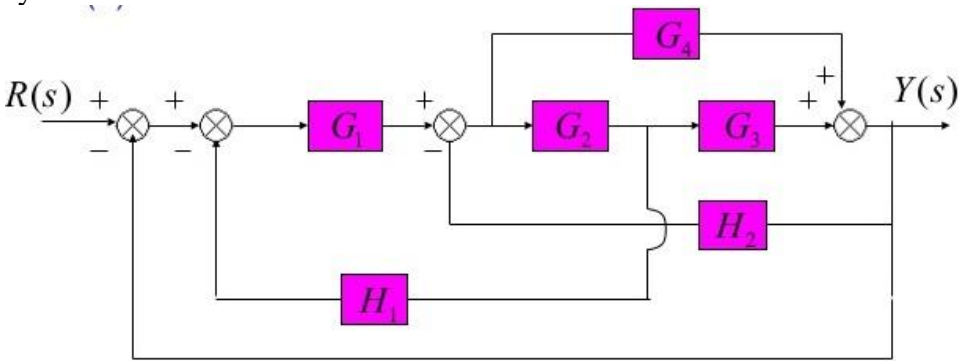
S. No.	Question	Marks Allotted
13	Differentiate between static and dynamic characteristics of an instrument.	2
14	Mention the principle of flow measurement and torque measurement.	2
15	Mention different types of Control Systems.	2
16	Define Stability of a control system and mention a method to check it.	2

SECTION-C

(Descriptive Answer Type Questions)

Note: All Questions are compulsory: -

[4X4=16 Marks]

S. No.	Question	Marks Allotted
17	<p>Draw the free body diagram and determine $X_2(s)/F(s)$ for the system given below. Neglect the friction f_{v1} and f_{v2} drag in between the blocks and the floor.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">OR</p> <p>Using Block Diagram Reduction Technique, find the transfer function of the control system drawn below.</p> <div style="text-align: center;">  </div>	4

18	Derive the time response of first order system fed with unit step input	4
19	Explain the working of LVDT with neat sketch. OR Give classification of sensors and explain in brief.	4
20	Give different classification of sensors and transducers. Briefly explain.	4

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 $\frac{x_5}{x_1}$ for the control system depicted by equations given below</p> $x_2 = a_{12}x_1 + a_{32}x_3 + a_{42}x_4 + a_{52}x_5$ $x_3 = a_{23}x_2$ $x_4 = a_{34}x_3 + a_{44}x_4$ $x_5 = a_{35}x_3 + a_{45}x_4$	6
22	<p>Apply Routh-Hurwitz criterion to the following equation and investigate the stability for: $Q(s) = s^6 + 2s^5 + 3s^4 + 5s^3 + 8s^2 + 10s + 5$ OR A unity feedback system has a forward path transfer function</p> $G(s) = \frac{20}{s(s+4)}$ <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>Write brief notes on:</p> <ol style="list-style-type: none"> Static characteristics of an instrument. Ultrasonic meter. <p>OR</p> <p>What are various temperature measuring devices used and explain the working of a Thermocouple with neat sketch.</p>	6
24	Define and explain static and dynamic characteristics of an instrument.	6