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**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
MID TERM EXAMINATION - NOV 2023**

Semester : Semester III - 2022

Course Code : EEE3052

Course Name : Sem III - EEE3052 - Control Systems for Robotic Applications

Program : B. TECH

Date : 2-NOV-2023

Time : 2:00PM - 3:30PM

Max Marks : 50

Weightage : 25%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS

(5 X 2 = 10M)

1. Stability is the most desired property in designing of control systems. Describe the terms absolute stability and relative stability.
(CO1) [Knowledge]
2. Explain the difference between linear systems and nonlinear systems
(CO1) [Knowledge]
3. The feedback concept has been the foundation for control system analysis and design. List any two differences between open loop and closed loop control systems.
(CO1) [Knowledge]
4. Define the terms Poles and Zeros of a transfer function
(CO2) [Knowledge]
5. For analyzing and designing control systems, we must have a basis of comparison for time response of various control systems. This is accomplished by subjecting the systems to be compared with the typical test signals and recording the time responses. List 2 commonly used test signals with their mathematical representation and Laplace transform
(CO2) [Knowledge]

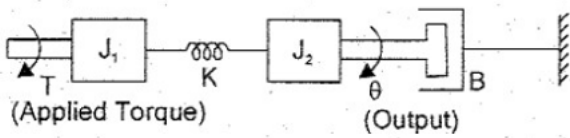
PART B

ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

6. Rotational mechanical systems move about a fixed axis. A disc of moment of inertia J is rotated with an applied torque of T Nm. The disc is fixed at one end using an elastic shaft. Assuming the disc can be modelled using moment of inertia J , Damper B and spring constant K , obtain its mathematical model.
(CO1) [Comprehension]

7. The control systems can be represented with a set of mathematical equations known as mathematical model. These models are useful for analysis and design of control systems. Obtain the differential equation governing the mechanical rotational system given below and construct the Transfer function.



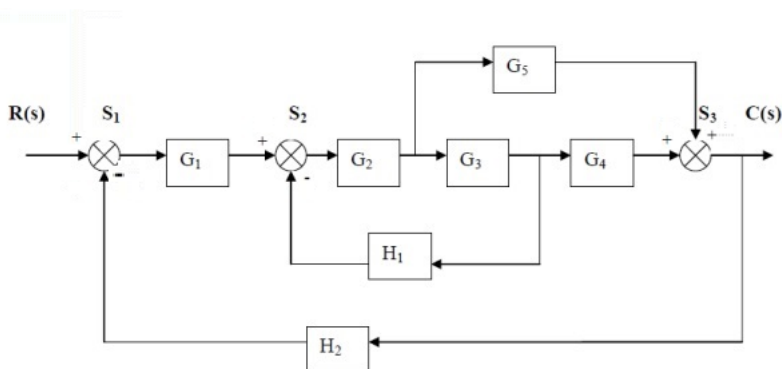
(CO1) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

8. Using Block diagram reduction techniques reduce the block diagram given below and obtain the transfer function.



(CO1) [Application]