

## ANURAG Engineering College

(An Autonomous Institution)

II B.Tech II Semester Supplementary Examinations, December-2024

## CONTROL SYSTEMS

(ELECTRONICS AND COMMUNICATIONS ENGINEERING)

Time: 3 Hours

Max. Marks: 75

## Section – A (Short Answer type questions)

(25 Marks)

Answer All Questions

	Course Outcome	B.T Level	Marks
1. What are the merits and demerits of closed loop control systems.	CO1	L1	2M
2. State and explain the Mason's gain formula	CO1	L2	3M
3. What is the difference between type and order of a system?	CO2	L1	2M
4. what is meant by steady state error.	CO2	L1	3M
5. What are the difficulties faced while applying R-H criteria?	CO3	L1	2M
6. What are the advantages of frequency response analysis?	CO3	L1	3M
7. What is polar plot?	CO4	L1	2M
8. What is lead compensation? Outline the pole zero diagram of lead compensator	CO4	L2	3M
9. Define state transition matrix?	CO5	L1	2M
10. Write the general procedure to determine the state space models of a control system.	CO5	L1	3M

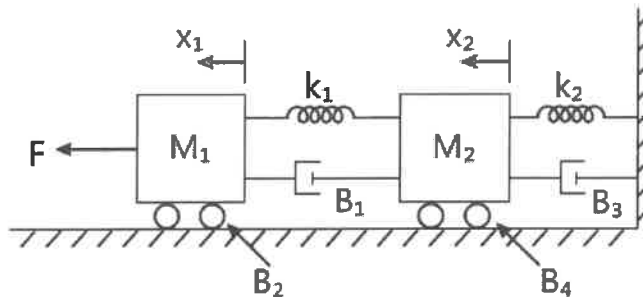
## Section B (Essay Questions)

Answer all questions, each question carries equal marks.

(5 X 10M = 50M)

11. A) i) Examine the effect of feedback system  
ii) Write the differential equations governing the Mechanical system shown in fig. and obtain overall transfer function

CO1	L3	5M
		5M



OR

- B) i) Analyse the principle of operation of synchro transmitter and receiver?  
ii) Derive the transfer function of an AC Servo motor with neat diagram
12. A) i) Sketch the response of second order system for critically damped case and when input is unit step.  
ii) Derive the expressions for peak time and settling time of a standard second order under damped system.
- OR
- B) What are the standard test signals and Analyse the time response of first order system when inputs are standard test signals,

CO1	L3	5M
		5M
CO2	L3	5M
		5M
CO2	L3	10M

13. A) Sketch the root locus diagram for a feedback system. The characteristic equation of which is given by,  $G(S)H(S) = \frac{K}{s(s+2)(s^2+2s+2)}$  Show clearly the steps involved
- OR**
- B) i) Describe the Routh's criteria with an example. What are its limitations?  
ii) derive the expression for bandwidth
14. A) Sketch the Nyquist plot for the closed loop system, whose open-loop transfer function is given as  $G(S) = \frac{K}{s(s+1)(s-1)}$  Determine the stability of open loop and closed loop systems?
- OR**
- B) i) Describe the procedure for designing lag compensator.  
ii) With neat diagram, describe the function of PID compensation in detail?
15. A) Construct the state model and state transition matrix (t) for a system characterized by the differential equation  $\frac{d^3y}{dt^3} + 3\frac{d^2y}{dt^2} + 3\frac{dy}{dt} + y = u$
- OR**
- B) Derive of state model of an armature-controlled D.C. Servo Motor