

Exam.Code:0935  
Sub. Code: 6669

2063

B.E. (Electrical and Electronics Engineering)  
Fifth Semester  
PC-EE-502: Control Engineering - II

Time allowed: 3 Hours

Max. Marks: 50

*NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.*

x-x-x

1. (a) Write state model equations and draw block diagram for them.
- (b) Draw block diagram showing difference between feedforward and feedback control.
- (c) What is the difference between a compensator and controller?
- (d) Find z-transform of exponential function.
- (e) What is the purpose of using ZOH in digital control systems?

(5 \* 2)

**PART-A**

2. (a) Obtain phase variable state model for a system described by following differential equation:

$$\frac{d^3y(t)}{dt^3} + 5\frac{d^2y(t)}{dt^2} + \frac{dy(t)}{dt} + 2y(t) = u(t)$$

Also, draw block diagram for it.

- (b) A linear time invariant system is described by the following differential equations:

$$\frac{dx_1(t)}{dt} = -2x_1(t) + 4x_2(t) \quad ; \quad \frac{dx_2(t)}{dt} = -2x_1(t) - x_2(t) + u(t)$$

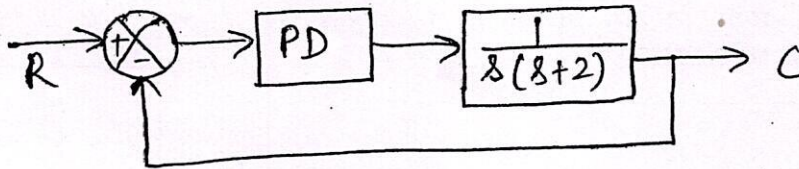
Comment on controllability and stability of system.

(5, 5)

P.T.O.

(2)

3. (a) What is the importance of tuning of PID controllers? Explain Zeigler Nichols method for this.
- (b) For the following system, find the parameters of PD controller if maximum overshoot is 25% and settling time is 0.5 seconds.



(5, 5)

4. Explain how a LAG Compensator can be designed using any frequency domain approach. Clearly explain all the steps with one example.

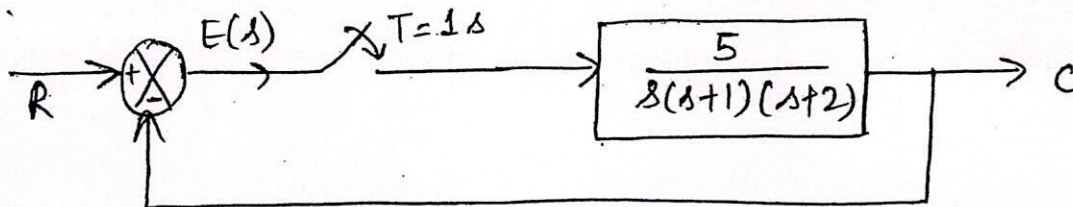
(10)

**PART- B**

5. (a) Find z-transform of  $e^{-at} \cos \omega t$ .
- (b) Derive formula for pulse transfer function of a digital control system if sampler is present in both error signal path and in feedback path.

(4, 6)

6. For the following system, determine characteristic equation in z-domain and find stability using bilinear transformation.



(10)

7. (a) Discuss operation and working of stepper motor and its control.
- (b) Explain working and operation of digital position control system.

(5, 5)