CONTROL THEORY-II

RIC 701

**COMPREHENSIVE ASSIGNMENT-1, 2**

1. Describe sample and hold operation with circuit diagram.
2. Discuss the system with sampler and zero order hold.
3. What is zero order hold? Derive its transfer function.
4. Explain constant damping loci.
5. Expalin Constant frequency loci.
6. Determinez transform of. Let input *r(t)* is given to S/H circuit. Prove that if T 0 output of sample and hold circuit is same as input.
7. Derive the expression to convert continuous time signal (s-plane) to discrete time signal (z-plane) using bilinear transformation.
8. Assume *y*(0)=0, *y*(1)=1, u(k) is the unit step function, Solve the following differential equation for *k*0.

Show all steps involved to determine partial fraction coefficient.

1. Consider the characteristics polynomial

Using Jury table, determinewhether system is stable or not (Show all steps).

1. Explain digital PID controller. Also draw the suitable diagram having digital PID controller with plant.
2. Explain Ziegler-Nichols tuning method based on ultimate gain and ultimate time period.
3. Discuss an error sampled feedback system (derive transfer function).

**COMPREHENSIVE ASSIGNMENT-3,4**

1. Do the direct realization for third order transfer function.
2. Do the cascade realization for third order transfer function.
3. Expalin the concept of controllability and observability.
4. A linear time invariant continuous time system can be described by a state model of the form **,**  , **Determine the solution** of above non homogeneous state equation. With the help of this solution derive the discrete time system.
5. Evaluate f(A) = eAT for
6. Describe Lyapunov’s stability for spring-mass-damper system.
7. For nonlinear autonomous system,

write sufficient conditions of stability using Lyapunov’s stability theorem.

1. Draw and explain the structure of state feedback control system.
2. What is performance index? Write its expression.
3. For finite stage state regulator**, derive the expression** of performance index, feedback gain algorithm and optimal control law.
4. What is Kalman filter? What are the applications of Kalman’s filter?
5. Write all the necessary expressions like prediction algorithm, gain algorithm, variance algorithm of Kalman’s filter.
6. Calculate the Kalman’s gain K(*k*) for *k* =1, and 2 for the following estimation problem

**COMPREHENSIVE ASSIGNMENT-5**

1. Draw the block diagram of microprocessor-based position control system and explain it.
2. Discuss in brief (short) about digital quantization.
3. Consider a digital control algorithm of the form:

Do the controllable canonical realization, parallel realization, cascade realization.

1. Give the general description microcontroller. With the help of neat and clean diagram explain microprocessor (μp) based control system.