

Code No: NR-320803

**NR**

**III B.Tech II Semester Supplementary Examinations April/May- 2005**

**PROCESS DYNAMICS AND CONTROL**

**(Chemical Engineering)**

**Time: 3 hours**

**Max.Marks:80**

**Answer any FIVE questions**

**All questions carry equal marks**

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- 1.a) What is a first order system ? What are its characteristic parameters ? Define the time constant and rise time for a first order system.
- b) An isothermal, constant hold up, constant through put CSTR with a first order irreversible reaction is described by

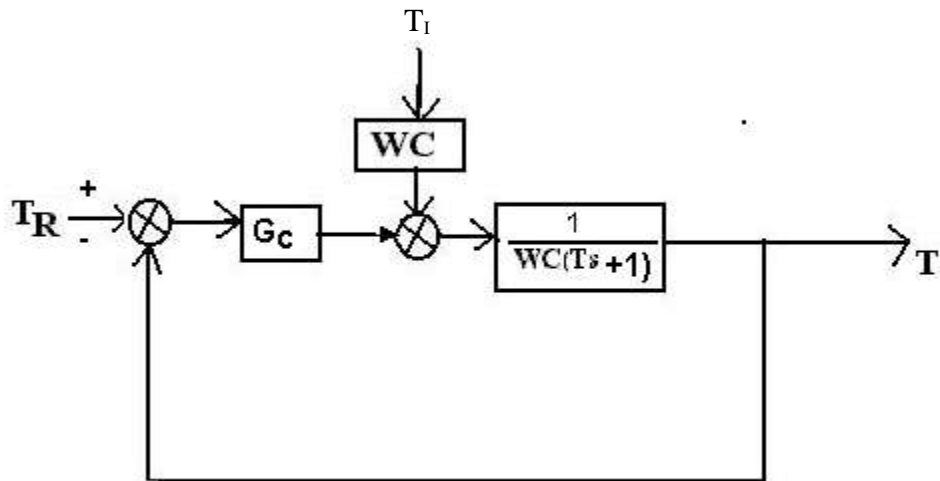
$$\frac{dC_A}{dt} + \left( \frac{F}{V} + k \right) C_A = \frac{F}{V} C_{A0}$$

Assuming  $F$ ,  $V$ , and  $k$  as constants, derive an expression for the solution of reactant concentration  $C_A$  for a step change in feed concentration  $C_{A0}$ .

- 2.a) Define and explain transportation lag.
- b) Develop transfer function for transportation lag.
- 3.a) Give the advantages and disadvantages of pneumatic controllers with electronic controller.
- b) Define proportional band and gain of a controller. How are they related.

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4. For the control system shown below explain the Response of proportional control and proportional Integral control for load change.



- 5.a) Discuss how Routh test used for determining the stability of a control system for a general polynomial characteristic equation.
- b) Write about the draw backs of Routh test and how are they over come.
- 6.a) Explain the concept of Root Locus.
- b) Explain the procedure of plotting root locus diagram. State also the rules.
7. Write briefly on the following.
- (a) Gain and phase margins
- (b) Frequency response for process control.
- 8.a) Explain feedforward control using a neat schematic.
- b) Present a comparative analysis of feedforward and feedback strategies.