http://www.howtoexam.com

Roll Number:

Thapar University, Patiala

Department of Electrical and Instrumentation Engineering

BE-EIC (6th Semester)
March 2009
Time: 02 Hours; MM: 30

EI-005: Process Dynamics and Control

Name of Faculty: Dr. Yaduvir Singh

Note: Attempt all four (04) questions. All questions carry equal marks. Make suitable assumptions, if needed. Support your answers with relevant mathematical derivations, examples, case studies and illustrations, as and where applicable.

Q. No. 1: What are the various steps involved in the development of the control strategy? A process furnace heats a process stream from near ambient temperature to a desired temperature of say 200°C. The process stream outlet temperature is regulated by manipulating the flow rate of fuel gas to the furnace. Formulate a complete control strategy in this process case.

Q. No. 2: Explain linearization of non-linear models for one state variable, one state one input and output variable. For the jacketed stirred-tank heater as shown in the figure 1 below, develop a linearized model with the equations A_{11}, A_{12}, A_{21} and A_{22}, and matrices B, C and D explicitly worked out.

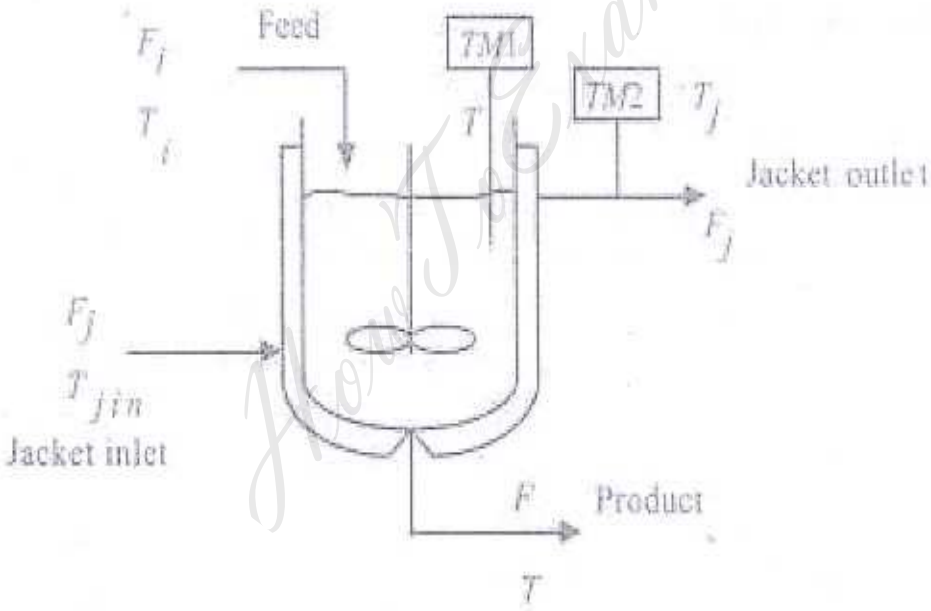

Figure 1 : Jacketed stirred-tank heater

Q. No. 3:
(a) Define and prove initial and final value theorems of Laplace transforms.
(b) Fine Laplace transform of " $d^n f/dt^n$ ".

Q. No. 4:
(a) What will be the characteristic behavior of a second order process, if it has two real and distinct roots? Prove your answer.
(b) Take a process example and evince the effects of dead time compensation by using Pade' first and second order approximations.

$$$$$$$$$$$$$$$$$$$$$$

College semester examination question papers for all subjects and branches