

**BIRLA INSTITUTE OF TECHNOLOGY MESRA : RANCHI
(END SEMESTER EXAMINATION)**

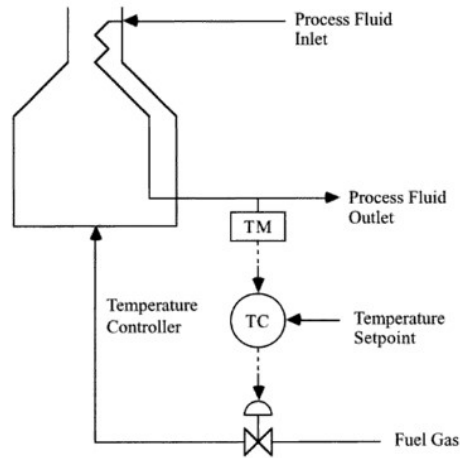
CLASS : MTech
BRANCH : ECE
TIME : 2.00 HOURS

SEMESTER : II
SESSION : SP-22
FULL MARKS : 50

SUB: EC568 PROCESS CONTROL

1.(a)

[5]



Mention the control strategy involved in this process. Find out the process gain. Check whether the control valve is air to open or air to close type. Modify the process diagram using feed forward controller.

1.(b) If the maximum flow rate through the valve is 120 gallon/min and the valve is fully closed at 3psig and fully open at 15psig, find the valve gain and the fail safe condition. [5]

2.(a) Find the closed loop controller transfer function of the process If [5]

$g_p(s) = \frac{-3s + 1}{(2s + 1)(4s + 1)}$, the model is perfect. Use all pass factorization and filter coefficient $\lambda=1$.

2.(b) Write down the mass balance equation. Compare between integral balance and instantaneous balance. [5]

3.(a) Compare between static and dynamic controller. Write down the condition in which the dynamic controller will have faster response than the static controller. [05]

3.(b) With suitable diagram explain the operation of burner when fuel flow set point is changed. The two inputs to the burner are fuel gas and the combustion air. [05]

4.(a) Define relative gain array(RGA). Find out the elements of RGA matrix. Find out the relationship between each element. [05]

4.(b) Find transfer function of the feed forward controller if the process transfer [05]

function is $\frac{2s + 1}{(3s + 1)(4s + 1)}$ and disturbance transfer function is $\frac{1}{(4s + 1)}$.

5.(a) Explain snowball effect in a recycler. How it can be minimized. [05]

5.(b) A reactor volume of 300 moles and a reaction rate constant of 0.6 hr^{-1} . If the make-up feed stream flow rate is 120 moles/ hour calculate the recycler feed stream flow rate. [05]