

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: MTech
BRANCH: ECE

SEMESTER : II
SESSION : SP/19

SUBJECT: EC568 PROCESS CONTROL INSTRUMENTATION

TIME: 3.00 Hrs.

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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- Q.1(a) Draw the basic instrumentation diagram of a heat exchanger. Develop the control strategy for this process. Find out the process gain. [5]
- Q.1(b) Write down the mass balance equation. Compare between integral balance and instantaneous balance. [5]
- Q.2(a) Write down the condition in which the dynamic controller will have the faster response than the static controller. [5]
- Q.2(b) Find the closed loop transfer function of the process using open loop controller design procedure If $g_p(s) = \frac{-2s+1}{(3s+1)(4s+1)}$, the model is perfect. Use all pass factorization and filter coefficient $\lambda=1$. [5]
- Q.3(a) Define Relative Gain Array (RGA). The process transfer functions are $g_{11}(s) = \frac{3}{s+4}$, $g_{12}(s) = \frac{1}{s+1}$, $g_{21}(s) = \frac{s+1}{s+2}$, $g_{22}(s) = \frac{1}{s+2}$ and the controllers are proportional controller of gain 2. Find the relative gain matrix. [5]
- Q.3(b) Draw the block diagram of a IMC based feed forward control system. Find out the input output relationship. [5]
- Q.4(a) Explain the operation of a recycler with suitable diagram. Explain how the snow ball effect can be minimized. [5]
- Q.4(b) Find the P corrected prediction output using Dynamic matrix Control. There are P prediction horizon and M control horizon. [5]
- Q.5(a) Write short notes on catalytic cracking. [5]
- Q.5(b) Write short notes on PVC production. [5]

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