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COLLEGE OF ENGINEERING, PUNE-5
(An Autonomous Institute of Govt. of Maharashtra)

END Semester Exam
(IE 412) PROCESS MODELING AND OPTIMIZATION

Programme: Final B. Tech Instrumentation

Year: 2012-13

Semester VIII

Duration: 3 hr

Max. Marks: 50

Instructions:

1. Figures to right indicate full marks.
 2. Draw neat diagrams wherever required.
 3. All questions are compulsory.
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Q.1 A Derive the integrated rate equation for second order reaction in terms of conversion for irreversible bimolecular type reaction. **6**

B How will you develop a model for given plant? **4**

Q.2 A Define: **6**

- 1) Time value of money
- 2) Measures of Profitability
- 3) Equipment Cost

B The table below gives the temperature T (in $^{\circ}\text{C}$) and lengths l (in mm) of a heated rod. If $l = a_0 + a_1T$, find the best values for a_0 and a_1 . **4**

T	20°	30°	40°	50°	60°	70°
l	800.3	800.4	800.6	800.7	800.9	801.0

Q.3 A Minimize $F = -x_1 + x_2$ **6**

Subject to

$$2x_1 - x_2 \geq -2$$

$$-x_1 + 3x_2 \geq -2$$

$$-x_1 - x_2 \geq -4$$

$$x_i \geq 0, \quad i = 1, 2$$

Use simplex method.

- B** How to solve the quadratic optimization problem? What are its important conditions? **4**
- Q.4 A** Explain model predictive control with example. **6**
- B** How will you implement adaptive control for a combustion system? **4**
- Q.5 A** Describe basic elements of a fuzzy logic system with the help of suitable example. **6**
- B** What are the advantages of neural network? Explain McCulloch-Pitts neuron. **4**

All the Best