

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VIII (NEW) EXAMINATION – SUMMER 2024****Subject Code:2180503****Date:14-05-2024****Subject Name:Process Modeling, Simulation & Optimization****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

	Marks
Q.1 (a) Differentiate deterministic and stochastic process.	03
(b) Explain modular approach in brief.	04
(c) Give classification of models in detail.	07
Q.2 (a) Explain Black box model.	03
(b) What are the uses of mathematical models?	04
(c) Explain modeling of non-isothermal CSTR.	07
OR	
(c) Derive the mathematical expression an ideal binary distillation column. List all assumptions.	07
Q.3 (a) Explain partitioning.	03
(b) For linear programming explain simplex algorithm.	04
(c) Minimize a nonquadratic function $f(x) = x^4 - x + 1$ using quasi newton's method with starting point of $x^q = 3$ and $x^p = -3$.	07
OR	
Q.3 (a) Explain tearing.	03
(b) Explain steady state and dynamic simulation.	04
(c) What is linear programming? State the linear programming in standard form and write down its application in chemical industries.	07
Q.4 (a) Differentiate concavity and convexity with example.	03
(b) Explain optimizing recovery of waste heat recovery.	04
(c) Discuss obstacles to optimization.	07
OR	
Q.4 (a) Define global maximum and local maximum.	03
(b) Write the various equations of motion for process modeling	04
(c) Discuss general procedure to solve optimization problem.	07
Q.5 (a) Define simulation and optimization.	03
(b) Explain how one-dimensional search is applied in a multidimensional problem?	04
(c) Minimize a nonquadratic function $f(x) = x^4 - x + 1$ using newton's method with starting point of $x = 3$.	07

OR

- Q.5** (a) List the various professional simulators and Equation Solver Software. **03**
(b) Explain Random search and grid search method for unconstrained multivariable optimization. **04**
(c) Minimize a nonquadratic function $f(x) = x^4 - x + 1$ using finite difference newton's method with starting point of $x = 3$ and $h = 0.1$. **07**
