

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V EXAMINATION – SUMMER 2025****Subject Code:3154201****Date:13-05-2025****Subject Name:Optimization Techniques****Time:02:30 PM TO 05:00 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**

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|------------|---------------------------------------------------------------------------------------------------|-----------|
| <b>Q.1</b> | (a) What is the objective function?                                                               | <b>03</b> |
|            | (b) Write a short note on Design vector and constraints                                           | <b>04</b> |
|            | (c) Explain Classification of Optimization Problems and its types.                                | <b>07</b> |
| <b>Q.2</b> | (a) Explain about Multi variable optimization and give example                                    | <b>03</b> |
|            | (b) What is Constraints? Explain Multivariable Optimization with No Constraints.                  | <b>04</b> |
|            | (c) What is Equality and Inequality Constraints for Multivariable Optimization?                   | <b>07</b> |
|            | <b>OR</b>                                                                                         |           |
|            | (c) What is convex programming? Explain with example.                                             | <b>07</b> |
| <b>Q.3</b> | (a) What is penalty function method?                                                              | <b>03</b> |
|            | (b) Short note : Direct root methods                                                              | <b>04</b> |
|            | (c) Explain random and grid search methods for unconstrained optimization                         | <b>07</b> |
|            | <b>OR</b>                                                                                         |           |
| <b>Q.3</b> | (a) Explain Unimodal function for non linear Programming                                          | <b>03</b> |
|            | (b) Explain importance and use of Powell's method                                                 | <b>04</b> |
|            | (c) Explain indirect methods for constrained optimization                                         | <b>07</b> |
| <b>Q.4</b> | (a) Write a short note : Goldent section method                                                   | <b>03</b> |
|            | (b) What is linear Programming? explain its different methods                                     | <b>04</b> |
|            | (c) Explain different search methods for non linear programming                                   | <b>07</b> |
|            | <b>OR</b>                                                                                         |           |
| <b>Q.4</b> | (a) Explain one-dimensional minimization method                                                   | <b>03</b> |
|            | (b) Explain fibonacci method with example                                                         | <b>04</b> |
|            | (c) Give difference and appropriate example of Interval halving method and Direct root methods    | <b>07</b> |
| <b>Q.5</b> | (a) Explain Hookes and Jeeves' method with example                                                | <b>03</b> |
|            | (b) Short note : Genetic Algorithms                                                               | <b>04</b> |
|            | (c) Give difference and example of ant colony and fuzzy optimization techniques                   | <b>07</b> |
|            | <b>OR</b>                                                                                         |           |
| <b>Q.5</b> | (a) What are the important applications of modern methods of optimization?                        | <b>03</b> |
|            | (b) What is Neural-Network based Optimization?                                                    | <b>04</b> |
|            | (c) Explain modern methods of optimization with example: (i) Tabu search (ii) Simulated Annealing | <b>07</b> |

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