

# GUJARAT TECHNOLOGICAL UNIVERSITY

## INDUSTRIAL ENGINEERING

### B. E. SEMESTER: VII

Subject Name: **Resource Optimization Techniques**

Subject Code: **171503**

| Teaching Scheme |          |           |       | Evaluation Scheme   |           |                           |                      |
|-----------------|----------|-----------|-------|---------------------|-----------|---------------------------|----------------------|
| Theory          | Tutorial | Practical | Total | University Exam (E) |           | Mid Sem Exam (Theory) (M) | Practical (Internal) |
|                 |          |           |       | Theory              | Practical |                           |                      |
| 4               | 4        | 0         | 8     | 70                  | 30        | 30                        | 20                   |

| Sr. No | Course Content  | Total Hrs. |
|--------|---|------------|
| 1.     | <b>Introduction:</b><br><br>The origin, development, nature, definitions, and history of operations research. Scope and phases of O.R methods. Problem formulation model construction, deriving solutions from models.  | 2          |
| 2.     | <b>Assignment Problems:</b><br><br>Assignment problems, Methodical statement, important theorems, Hungarian method, Unbalanced and maximization problems. Travelling salesman problems.   | 6          |
| 3.     | <b>Linear Programming :</b><br><br>(a) General linear programming problems, mathematical formulation graphical method for the solution of L.P.P. simplex method, slack and surplus variables, degeneracy, duality in L.P.P., sensitivity analysis, and integer programming. | 16         |
| 4.     | <b>Transportation problems:</b><br><br>Vogel's approximate methods, optimality test, Modi method, stepping-stone method, degeneracy, unbalanced transportation problems, transshipment problems.  | 12         |
| 5.     | <b>Queuing theory:</b><br><br>Introduction, random arrivals to queue and exponential service times, simulation of queues (only application of problems).  | 8          |
| 6.     | <b>Replacement theory:</b><br><br>Introduction, replacement by alternative equipment, money value changing  | 8          |

|           |  |          |
|-----------|--|----------|
|           | with time type replacement problems, group replacement policy, staffing problems.  |          |
| <b>7.</b> | <b>Sequencing problems:</b><br><br>Introduction, sequencing problems on n-jobs on two machines, n-jobs on three machines, and n-jobs on m-machines. Graphical method of 2-jobs on m-machines problems. | <b>4</b> |
| <b>8.</b> | <b>Game theory:</b><br><br>Introduction, Two-persons-zero-sum games, pay of matrix, strategy, saddle point, algebraic method, method of sub games for game theory problems.                            | <b>8</b> |

### Reference Books:

1. Operations Research: By JK Sharma, MacMillan Business books
2. Operations Research by V.K. Kapoor
3. Operations Research by Hamdy H. Taha
4. Fundamentals of operation Research by Russell L. Ackoff and Maurice W. Sasieni.
5. Operations Research (Methods and problems) by Sasieni M., L. Friedman.
6. Operation Management by Elword S. Buffa.
7. Operation Research by R.C.Gupta.