GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3161507
SUBJECT NAME: **Resource Optimization Techniques**
6th SEMESTER

Type of Course: -

Pre-requisite:-

Rationale:
Resource Optimization techniques now a day widely used in the area of decision making for the real life problems. Managers and decision makers get idea for optimizing and approximating industrial Engineering problems. They not only strive to devise appropriate measures for problem solving but also apply scientific techniques to monitor the organizations ongoing activities such as Production mix, Transportation, Assignment, Queuing, Game theory, Replacement, Project Management and simulation problem.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE(E)	PA (M)	ESE (V)	PA(I)	
4	0	2	5	70	30	30	20	150

CONTENT:-

Sr. No.	Course Content	Total Hours
1	**Linear Programming Problem:** Origin of Operation Research, Historical Standpoint, Methodology, Different Phases, Characteristics, Scope and Application of Operations Research. Linear Programming Problem: Introduction, Requirement of LP, Basic Assumptions, Formulation of LP, General Statement of LP, Solution techniques of LP: Graphical Methods, Analytical Methods: Simplex, Big M and Two Phase, Special Case of LP Problem, Sensitivity Analysis, Duality of LPP.	12
2	**Transportation and Assignment:** Transportation Problems definition, Linear form, Solution methods: North west corner method, least cost method, Vogel's approximation method. Degeneracy in transportation, Modified Distribution method, Unbalanced problems and profit maximization problems. Transshipment Problems. Assignment Problems and Travelling sales man Problem.	08
3	**Queuing Theory:** Basis of Queuing theory, elements of queuing theory, Kendall's Notation, Operating characteristics of a queuing system, Classification of Queuing models, Preliminary examples of M/M/1:∞/∞/FCFS.	08
4	**Replacement Analysis:** Introduction, Replacement of capital equipment which depreciated with time, replacement by alternative equipment, Group and individual replacement policy.	06
5	**Game Theory:** Introduction, Characteristics of Game Theory, Two Person, Zero sum games, Pure strategy. Dominance theory, Mixed strategies (2x2, M x2), Algebraic and graphical methods.	08
6	**Decision Theory:** Introduction, Decision under certainty, Decision under risk, Decision under uncertainty: Laplace criterion, MaxiMin criterion, MiniMax criterion, savage MiniMax regret criterion, Hurwicz criterion, Decision tree.	06
7	**Project Management:** Introduction to PERT and CPM, Critical Path calculation, float calculation and its importance. Cost reduction by Crashing of activity.	08

8	**Simulation:** Introduction, Philosophy, Development and Implementation of simulation models, Design of simulation models, Examples: Performance of a baseball hitter, Simulation of a tool crib, Production line maintenance. Pseudo-Randon numbers, Techniques of generation of random numbers. Application of simulation.	04
	Total	60

Reference Books:

1. Operations Research: An Introduction by HamdyTaha, Pearson Education Inc
2. Operations Research: Principles and Practice by Pradeep PrabhakarPai, Oxford Higher Education, Oxford University press
3. Operations Research: Principles and Practice by Ravindran Phillips and Solberg by Wiley India Edition,
4. Operations Research by P Mariappan, Pearson
5. Operations Research by A M Natarajan, P Balasubramani, A Tamilarasi, Pearson Education Inc
6. Operations Research by H N Wagner, Prentice hall.
7. Optimization in Operations Research by Ronald Rardin, Pearson Education Inc.
8. Operations Research by R. Paneerselvam, Prentice Hall of India Pvt. Ltd.
9. Quantitative Techniques in Management by N D Vohra, Tata McGraw-Hill

Distribution of marks weightage for cognitive level

Bloom's Taxonomy for Cognitive Domain	Marks % weightage
Recall	10
Comprehension	10
Application	30
Analysis	30
Evaluate	20
Create	-

Course Outcome:

After learning the course the students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Interpret mathematical models of actual industry problems for optimal solution.	10
CO-2	Make use of LPP techniques for maximize profit and minimize loss in industry.	20
CO-3	Dissect transportation, transhipment, assignment and travelling salesman and queuing problems for the best possible solution.	30
CO-4	Examine machine replacement policy, game theory and decision theory for selection of better choice from available options.	20
CO-5	Evaluate project through project management techniques for optimum utilization of resources and PERT simulation.	20

List of Experiments:

1. Industrial Problems of Linear Programming
2. Industrial Problems on Transportation

3. Industrial Problems on Assignment
4. Industrial Problems on Queuing
5. Industrial Problems on PERT and CPM
6. Problem of PERT simulation.

Major Equipment:

List of Open Source Software/learning website:

1. http://nptel.ac.in