GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3172212
Semester – VII
Subject Name: Mine System Engineering

Type of course: Professional Elective Course

Prerequisite: Before taking this subject, student must have studied surface and underground mining methods. Student must be aware of the procedures involved in mining.

Rationale: The subject is designed such that the student will be able to find the best possible system for mine working to which is time efficient, economical and safest.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1.	**Introduction to systems engineering:** Concept of system, sub-system and system environment; Classification of systems; Systems analysis; Creative aspects of planning and design; Factors influencing creativity, techniques and alternative ideas/solutions.	
2.	**Linear Programming:** Linear Programming models; Assumption of linear programming, Graphical and Simple method of solving Linear Programming Problems; Basic and Basic feasible solution, optimal solution, interpretation of SIMPLEX table. Primal and Dual Problem. Application of Linear Programming for solution of mining related problems of production planning, scheduling and blending.	
3.	**Transportation and Assignment Problem:** Transportation models, Variations on Classical Transportation models, Solution. Algorithm for Transportation problem. Assignment model, Variations on Classical Assignment model; solution algorithm for Assignment problems. Application to mining problems.	
4.	**Project Management with PERT & CPM:** Assumption of PERT and CPM; Methods of drawing network; Redundancy and identification of redundant jobs; Critical path calculation, Criticality index; Statistics related to PERT; Probability of completing a project by a due date, Lowest cost schedule: Case studies.	
5.	**Network Models:** Introduction and concept; shortest route and minimal spannial tree problems, application to mining problems.	
6.	**Simulation:** Introduction and concept; Scope and limitation; System type versus simulation technique; Generating input data; Monte-Carlo simulation; Simulation of equipment maintenance and inventory systems in mines.	

7.	**Inventory management:** Introduction , components and nature of inventory problems,; Classical E.O.Q model; EOQ model with quantity discount; Static and dynamic inventory problems.	

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10 %	**40 %**	**30 %**	**10 %**	**10 %**	**0 %**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

I. Cummins mining engineers handbook, vol II SME, AIME, New York,1979.
II. Sharma J.K. Mathematical Models In Operations Research. Tata Mcgraw-Hill, New Delhi, 1989
III. Taha H.A.-Operations Research and Introduction, Mc. Millan. ISBN-0-02-418940-5.
IV. hiller and Liberman, Introduction to Operation Research, Mc. GrawHill Edition.
V. S.D.Sharma-Operations Research, Kedarnath, Ramnath & Co.
VI. Philips, Ravindran and Soleberg- Principles of Operations Research- Theory and Practice, PHI
VII. Kanthi Swarup & Others- Operations Research, Sultanch and sons

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Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Apply theoretical principals into practical application for strategic planning of surface and underground mining operations.	34 %
CO-2	Apply basic manual procedures, algorithms, computer application and mathematical models for optimum mine working.	33 %
CO-3	Plan and valuate mining operations.	33 %