Optimization Techniques

Course Code	0210300314
Course Title	Optimization Techniques
Semester	II
Credit	4
Duration	40 hours (75 minutes per session)

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Faculty	Vijayanta Pawase

Course Description

The course is search for the best and most effective solutions using core tools applicable in prescriptive analytics. The course uses techniques for arriving at optimal or near optimal decisions for a given set of managerial objectives under various constraints. The course address variability in Resource Capacities, Profit and Cost Considerations and Changes in Technology in LPP Model for students to remember. The course helps students in understanding how to address several goals/ objective functions in a LPP Model. To analyse the optimal time of replacement of a machine in a manufacturing setup. Also, evaluation for getting solutions in multi stage decision problems. At the end of course, students can create and optimize networks which depict relationships between various components of the system.

Course Outcomes

Course Outcomes	Description	Cognition
After the completion of course, students should be able to		
0210300314.1	Illustrate the fundamentals of business analytics using optimization techniques.	**'L-3- Apply'**
0210300314.2	Determine the industry-relevant optimization techniques concepts and to provide real insights & better understanding of decision making in business.	**'L-4- Analyse'**
0210300314.3	Identify the optimization techniques for solving real time problems and improve the speed, reliability, and quality of decisions in business.	**'L-4- Analyse'**
0210300314.4	Construct a plan to work in a team in both research and business environments.	**'L-6- Create'**
0210300314.5	Evaluate various alternatives in order to cope up with the futuristic challenges and competitions in optimization techniques.	**'L-5- Evaluate'**
0210300314.6	Design value propositions for organizations using optimization tools and techniques.	**'L-6- Create'**

Mapping COs with POs

Scale 1- low alignment, 2- Moderate alignment, 3 – high alignment, - – No alignment

COs / POs	PO 1	PO 2	PO 3	PO 4	PO 5
0210300314.1	3	3	-	2	-
0210300314.2	3	3	1	1	1
0210300314.3	3	3	1	3	-
0210300314.4	1	1	-	1	3
0210300314.5	3	3	-	3	3
0210300314.6	3	2	2	2	1
CO	2.66	2.5	0.67	2	1.33
CO EQ	3	3	1	2	1

Course content

1. Role of Quantitative Optimization Techniques
2. Linear Programming Application
3. Linear Programming Optimization Models
4. Transportation Optimization Models
5. Integer & mixed integer programming
6. Integer & mixed integer application
7. Network Optimization and Theory of Games

Session	Topics	Reference Reading	Topics Mapped with CO	Case Study	Cognition
1,2,3	Introduction: Role of Quantitative Optimization Techniques Analysis in Decision Making	Ch-1 from text book Ch-1 (BR)	0210300314.1 & 0210300314.2		Applying & Analyzing
	Understand the role that optimization plays in business analytics and identify when optimization modelling is an appropriate technique to inform the decision-making process.				
4,5,6,7	Linear Programming Application	Ch-2,3 From text book and reference book (N.D)	0210300314.3	Solar Oil Company Blending Problem	Analyzing
	Formulation of LPP, Graphical Solutions, Simplex Methods, Post Optimality Analysis, Duality				
8,9,10,11,12	Linear Programming – Transportation Optimization Models	Ch-3 From text book and reference book (N.D)	0210300314.3		Analyzing
	Methods of Feasible Solution: North West Corner Rule, Row Mini-Max, Column Mini Max, Least Cost Method, Vogel's, Modi method, Degeneracy, Unbalanced Transportation Problems, Maximization and Minimization Types Problem, Allocation Restrictions.			Transportation Problem	
13,14,15,16,17	Linear Programming Assignment Optimization Models	Ch-9 from (BR)	0210300314.4, 0210300314.5		Creating & Evaluating
	Maximization and Minimization Types, Unbalanced, Hungarian Method, Non-Square Matrix.				
18,19,20,21,22,23	Integer and Mixed Integer Programming and Application	Ch-10 from (BR)	0210300314.5. 0210300314.6		Creating & Evaluating
24,25,26,27	Goal Programming - Example of Goal programming, Extension to Equally Important Multiple Goals.	Ch-7 from (ND), Ch-9 (AS)	0210300314.4, 0210300314.5		Creating & Evaluating
28,29,30,31,32	Network Optimization and Theory of Games	Ch-12 From (ND)	0210300314.5,0210300314.6		Creating & Evaluating
	Game Models, Two-person Zero Sum Game, Solution of 2 x n and n x 2 Games, Games of Pure and Mixed Strategy, Principle of Dominance.			Reacting fast or slow	

Pedagogy

- Lecture
- Case Study
- News/Article Analysis
- Live Activity/Exercise
- Videos

Assessment Criteria:

Class Attendance	5
Assignment	10
Tests	15
Case Study Analysis	10
Term End Examination	60 Marks

Text Book:

Quantitative Methods for Business - Anderson, Sweeney & Williams, Cengage Learning, Edition sixth, 2010. **(AS)**

Reference Books:

Quantitative Analysis for Management - Barry Render, Ralph M. Stair, Jr., Michael E. Hanna, T N Badri, Edition 1, 2009, Pearson, Education. **(BR)**

Essentials of Operations Research & Quantitative Techniques – K Shridhara Bhat, Edition second, 2010, Himalaya Publishing House. **(KS)**

Quantitative Techniques for Managerial Decisions – R B Khanna, Edition second, 2013, PHI Learnings. **(RB)**

Quantitative Techniques in Management, N D Vohra, 4th Edition, Tata McGraw Hill, 2nd reprint, 2010. **(ND)**

Quantitative Methods Theory and applications - J K Sharma, Mac Milan, 2010. **(J.K)**