University of Kerala

Discipline	Mathematics				
Course Code	UK4DSEMAT201				
Course Title	Introduction to Operations Research				
Type of Course	DSE				
Semester	IV				
Academic Level	200-299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours per week
	4	4			4
Pre-requisites	Matrix Theory				
Course Summary	At the end of the course student get the clear ides of using technique in algebra that uses linear equations to determine how to arrive at the optimal situation (maximum or minimum) as an answer to a mathematical problem, assuming the finiteness of resources and the quantifiable nature of the end optimization goal.				

Detailed Syllabus

Module	Unit	Contents	Hrs
I		**Linear Algebra**	**15**
	1	Simultaneous linear equations-Gaussian Elimination, Rules of Rank, Homogeneous linear equations (review only)	
	2	Lines and hyper plane	
	3	Convex sets	
	4	Convex hull	
	5	Basic results in linear programming (statement of the theorems only)	
	Chapter 5: Sections 5.2, 5.4 and 5.6, Chapter 6: 6.4, 6.5 and 6.7 of Text [1]		

Module	Unit	Contents	Hrs
II	**Introduction to Linear Programming**		**15**
	6	History of Operations Research	
	7	Definitions of Operations Research	
	8	Structure of Linear Programming Model	
	9	Advantages and limitations of Linear Programming	
	10	Linear Programming Model formulation	
	11	Examples of Linear Programming Model formulation	
	Chapter 1: Sections 1.2, 1.3 , Chapter 2: Sections 2.2, 2.3, 2.7, 2.8 of Text[2]		
III	**Graphical and Simplex Method**		**15**
	12	Important Definitions	
	13	Graphical Solution	
	14	Special Cases in Linear Programming	
	15	Standard form of an LPP	
	16	Simplex Algorithm *(Maximization case)*	
	17	Simplex Algorithm *(Minimization case)*	
	Chapter 3: Sections 3.2, 3.3 , 3.4, Chapter 4: Sections 4.2 and 4.3 of Text [2]		
IV	**Two-phase and Big-M Method**		**15**
	18	Two phase Method	
	19	Big-M Method	
	Chapter 4: Sections 4.4 of Text[2]		

Textbooks

1. G. Hadley: Linear Algebra, Narosa, Reprint, 2002.
2. J K Sharma, Operations Research - Theory and Applications, Laxmi Publications, Sixth Edition, 2016.

References

1. Hamdy A Taha, Operations Research an Introduction, Tenth edition, Pearson, 2021.
2. I.N Herstein, Linear Algebra, Wiley Eastern, 2006.
3. Kanti Swarup, P.K.Gupta, Man Mohan, Operations Research, Sultan Chand and Sons, 2005.
4. Kenneth Hoffman and Ray Kunze, Linear Algebra, Prentice Hall, 1981.
5. S. Kumaresan, Linear Algebra, Prentice Hall, 2000.
6. G Srinivasan, Operations Research - Principle and Applications, Second Edition, PHI Learning, 2010.

Course Outcomes

CO No.	Upon completion of the course the graduate will be able to	PO/PSO	Cognitive Level	Knowledge Category	Lecture(L) Tutorial (T)	Practical (P)
CO 1	Understand and apply the concept of mathematical modelling	PSO2, PSO3, PO2	R,U, Ap	F,P	L	
CO 2	Formulate LPP	PSO3, PO2	Ap , E	P	L	
CO 3	Solve LPP using Simplex Method	PSO2, PSO3, PO2	An, Ap	P	L	
CO 4	Solve LPP using Two-phase and Big M Method .	PSO2, PSO3, PO2	Ap,An	P	L	

(R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create)
(F-Factual, C-Conceptual, P-Procedural, M-Metacognitive)

Mapping of CO with PSOs and POs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	-	3	2	-	-	-	-	2	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	3	-	-	-	-	-	-
CO3	-	3	3	-	-	-	-	2	-	-	-	-	-	-
CO4	-	3	3	-	-	-	-	2	-	-	-	-	-	-

(- -Nill, 1-Slightly/Low, 2-Moderate/Medium, 3-Substantial/High)

Assessment Rubrics

- Quiz/Assignment/Discussion/Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

Mapping of COs to Assessment Rubrics

	Internal Examination	Assignment	Project Evaluation	End Semester Exam
CO1	✓	✓		✓
CO2	✓	✓		✓
CO3	✓	✓		✓
CO4	✓	✓		✓