



MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

COURSE PLAN

Department :	Humanities and Management			
Course Name & code :	Operations Research		HUM 3252	
Semester & branch :	VI Semester BTech		Data Science and Engineering	
Name of the faculty :	Prof. Mahesh Prabhu and Dr. Rajesh R Pai			
No of contact hours/week: 03	L	T	P	C
	3	0	0	3

COURSE OUTCOMES (COS)

At the end of this course, the student should be able to:		No. of Contact Hours	Marks	Program Outcomes (POs)	PSO	BL (Recommended)
CO1	Describe the basic assumptions, terminology, general structure, and applications of LP models, and queuing models and formulate the verbal statement of the decision model into a mathematical model.	6	20	PO1, PO2		BL1/BL2
CO2	Solve the LP problems using graphical/simplex/assignment and transportation algorithms.	20	60	PO2, PO3		BL2/BL3
CO3	Interpret the results obtained and conduct sensitivity analysis.	4	10	PO3, PO4		BL4/BL5
CO4	Describe the operating characteristics of queuing models in general and evaluate the system with known and unknown costs in respect of single channel-single phase/multi channel-single phase using either analytical or simulation methods.	6	10	PO1, PO2, PO3, PO4		BL3
Total		36	100			

COURSE LEARNING OUTCOMES (CLOS)

At the end of this course, the student should be able to:		No. of Contact Hours	Marks	Program Outcomes(POs)	Learning Outcomes (LOs)	BL (Recommended)
CLO1	Describe the basic assumptions, terminology, general structure, and applications of LP models, and queuing models and formulate the verbal statement of the decision	6	15	PO1, PO2	C1, C2	BL1/BL2

	model into a mathematical model.					
CLO2	Solve the LP problems using graphical/simplex/assignment and transportation algorithms.	20	60	PO2, PO3	C3	BL2/BL3
CLO3	Interpret the results obtained and conduct sensitivity analysis.	4	15	PO3, PO4	C3	BL4/BL5
CLO4	Describe the operating characteristics of queuing models in general and evaluate the system with known and unknown costs in respect of single channel-single phase/multi channel-single phase using either analytical or simulation methods.	6	10	PO1, PO2, PO3, PO4	C1, C2, C3	BL3
	Total	36	100			

LESSON PLAN

L No	TOPICS	Course Outcome Addressed
1	Introduction to the Operations Research	CO1
2	Introduction, Definition, and Phases of OR	CO1
3	Linear Programming Problems (LPP)- Introduction, Assumptions in LPP	CO1
4	Formulation of LPP for different applications	CO1
5	Formulation of LPP for different applications	CO1
6	Graphical solution to LPP	CO2
7	Graphical solution to LPP	CO2
8	Introduction to Simplex Algorithm	CO2
9	Maximization case	CO2
10	Minimization case	CO2
11	Equality constraints	CO2
12	Special cases of LPP	CO2
13	Practice sessions on simplex algorithm	CO2
14	Sensitivity Analysis of LPP	CO3
15	Sensitivity Analysis of LPP	CO3
16	Sensitivity Analysis of LPP	CO3
17	Introduction to Transportation Algorithm	CO2
18	Formulation of Transportation Algorithm	CO2
19	Transportation Algorithm-Generating basic feasible solution using North-West Corner Rule and Least Cost Method	CO2
20	Transportation Algorithm-Generating basic feasible solution using North-West Corner Rule and Least Cost Method	CO2
21	Testing for optimality using Stepping Stone Method	CO2
22	Testing for optimality using Modified Distribution Method (MODI Method)	CO2
23	Maximization case	CO2
24	Unbalanced problems and Multiple Optimal Solutions	CO2
25	Degeneracy	CO2
26	Post Optimality Analysis using transportation algorithm	CO3
27	Applications of Transportation Algorithm	CO1
28	Applications of Transportation Algorithm	CO1
29	Assignment Algorithm-Introduction	CO1
30	Solution to balanced and unbalanced assignment problems	CO2
31	Applications of Assignment Algorithm	CO2
32	Travelling Salesman Problem	CO2
33	Queuing Theory-Introduction	CO4
34	Single Channel Single Phase models	CO4
35	Infinite and Finite Population Models	CO4
36	Simulation Models	CO4

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	X	X													
CO2		X	X												
CO3			X	X											
CO4	X	X	X	X											
Articulation Level	M	M	M	M											

FACULTY MEMBERS TEACHING THE COURSE (IF MULTIPLE SECTIONS EXIST):

FACULTY	SECTION
Prof. Mahesh Prabhu H	B
Dr. Rajesh R Pai	A

References:

1. Taha, H. A. (2014). Operations Research-An Introduction, Ninth Edition. Pearson.
2. Sharma S D. (2005). Operations Research, KedarNath RamNath & Co.
3. Sharma J K. (2012). Operations Research-Theory and Application, Fifth Edition, Macmillan Publishers.
4. Wagner Harvey M (2009). Principles of Operations Research, Second Edition, Prentice Hall of India.

Submitted by: Prof. Mahesh Prabhu H



(Signature of the faculty)

Date: 02.01.2024

Approved by: Dr. Yogesh Pai P



(Signature of HOD)

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