TEACHING PLAN: Linear Programming

SCHOOL: (SOBAS) SCHOOL OF BASIC AND APPLIED SCIENCE		**ACADEMIC SESSION: 2023 - 2024**	**FOR STUDENTS' BATCH: B.Sc 2nd Sem.**
1	**Course No.**	MA-202	
2	**Course Title**	**Linear Programming**	
3	**Credits**	**2**	
4	**Learning Hours**	Per week two lectures Total hours; 28	
5	**Course Objective**	1. Understand the fundamentals of linear programming, including problem formulation and solution methods. 2. Analyze transportation and assignment problems within the context of linear programming. 3. Explore advanced topics like the simplex method, duality, and convex sets. 4. Apply various solution methods to optimize linear programming problems efficiently.	
6	**Course Outcomes**	1. Formulate and solve general linear programming problems using graphical and matrix methods. 2. Apply transportation and assignment algorithms to real-world scenarios. 3. Utilize the simplex method, artificial variables, and Big-M method to optimize solutions. 4. Demonstrate proficiency in dual simplex and primal-dual methods for linear programming problem-solving.	
7	**Outline syllabus:**		

7.01	**Paper Code**	**Unit**	**Introduction**	**Page Numbers[1]**	**Lectures**
7.02	**Unit I**	(a)	Linear programming problems, Statement and formation of general linear programming problems,	1.1 to 1.11	1,2
		(b)	Graphical method, slack and surplus variables, standard	2.1 to 2.15	3,4
		(c)	Matrix forms of linear programming problem, Basic feasible solution.	3.1 to 3.16	5,6,7
7.03	**Unit II**	(a)	Transportation problems, Assignment problems.	**3.17 to 3.30**	**8,9,10**
		(b)	Transportation problems, Assignment problems.	**3.31 to 3.35**	**11,12**
		(c)	Transportation problems, Assignment problems.	**4.1 to 4.50**	**13,14**
7.04	**Unit III**	(a)	Fundamental theorem of linear programming, simplex method Artificial variables,	**5.1 to 5.13**	**15,16**
		(b)	Big-M method, Convex sets.	**6.1 to 6.25**	**17,18, 19**
		(c	Fundamental theorem of linear programming, simplex method Artificial variables, Big-M method,	**6.26 to 6.30**	**20,21**
7.05	**MA 303 Unit IV**	(a)	Duality in linear programming problems,	**7.1 to 7.17**	**22,23**

		(b)	Dual simplex method	**7.18 to 7.30**	**24,25, 26**
		(c)	Primal-dual method.	**8.1 to 8.13**	**27,28**

8	**Course Evaluation**	
8.1	**Attendance**	5%
8.2	**Homework**	4 Assignments, 5%
8.3	**Quizzes**	2Quizzes, 5%
8.4	**Projects**	1 Project, 5%
8.5	**Presentation**	1 Presentation, 5%
8.2	**MTE**	20%
8.3	**End-term examination: 60%**	
9	**Text Books & References**	
9.1	**Text book**	1. Linear Programming, Jeevansons publication 2. Linear Programming, Wiley Eastern Ltd., New Delhi
9.2	**References**	
9.3	**Video References**	

[Q.1]

a) Explain in brief three methods of obtaining initial feasible solution for a Transportation

b)Define Basic feasible solution?

c) Define the linear programming problem?

d)Explain the Scope of operationresearch in industry ?

e)Define the operation research ?

[Q.2]

Using the graphic method ,

Find the maximum value of $Z = 2x_1 + x_2$

subject to conditions:

$x_1+2x_2 \leq 10$,

$x_1+x_2 \leq 6$,

$x_1- x_2 \leq 2$,

$x_1-2x_2 \leq 1$,

$x_1, x_2 \geq 0$

[Q.3] Define the linear programming. Explain its application in industrial field

[Q.4]

Find the initial feasible solution of the transportation problem by Row minima method& North west corner Rule

Plant	**Warehouse**				
	W_1	**W_2**	**W_3**	**W4**	**Supply**
A	6	4	1	5	**14**

B	8	9	2	7	**16**
C	4	3	6	4	**5**
Demand	**6**	**10**	**15**	**4**	

[Q.5]

Find the feasible solution oftransportation problem by VAM Method

Factory	**Distribution center**				**Supply**
	D_1	**D_2**	**D_3**	**D4**	
A	2	3	11	7	**6**
B	1	0	6	1	**1**
C	5	8	15	9	**10**
Demand	**7**	**5**	**3**	**2**	

[Q.6]

Five persons A,B,C D & E are to be assigned five jobs I, II, III ,IV & V. The cost matrix is given as under, find the proper assignment.

Operators → Machines ↓	**I**	**II**	**III**	**IV**	**V**
A	10	5	13	15	16
B	3	9	18	3	6
C	10	7	2	2	2
D	5	11	9	7	12
E	7	9	10	4	12

OR

[Q.7]State and Explain the characteristic of operation research ?

[Q.8]Use simplex method to solve the Following problem:

Minimize $Z = 2x_1 + x_2$,

Subjected to $x_1 + 2x_2 \leq 10$,

$x_1 + x_2 \leq 6$,

$x_1 - x_2 \leq 2$,

$x_1 - 2x_2 \leq 2$,

$x_1, x_2 \geq 0$.

[Q.9]Write the advantage and drawback of linear programming problem ?