Advance Engineering Mathematics(AEM)

Branch :Information Technology, Sem:IIIrd

Dr. Kashish Parwani

Associate Professor, Dept. of Mathematics

JECRC, Sitapura Jaipur

Vision of the Institute

To become a renowned centre of outcome based learning, and work towards academic, professional, cultural and social enrichment of the lives of individuals and communities

Mission of the Institute

- Focus on evaluation of learning outcomes and motivate students to inculcate research aptitude by project based learning.
- Identify, based on informed perception of Indian, regional and global needs, the areas of focus and provide platform to gain knowledge and solutions.
- Offer opportunities for interaction between academia and industry.
- Develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders may emerge.

Course Outcomes

- **CO2:** To learn the formulation of different mathematical problems into optimization problems.
- **CO3:** Apply the principles of optimization using differential calculus.
- **CO4:** To understand the concepts of Linear Programming
- **CO1:** To learn the concepts and principles of Random variables and Probability distribution.

Dr. Kashish Parwani
Associate Professor (Mathematics, JECRC, Jaipur

Transportation Problems:

WHAT IS TRANSPORTATION PROBLEM ?

- The transportation problem is a special type of linear programming problem where the objective is to minimize the cost of distributing a product from a number of **sources** or **origins** to a number of **destinations.**

- Because of its special structure, the usual simplex method is not suitable for solving transportation problems. These problems require a special method of solution.

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Associate Professor (Mathematics) JECRC, Jaipur

AIM OF TRANSPORTATION PROBLEM:

- To find out the **optimum** transportation schedule keeping in mind cost of Transportation to be **minimized**.
- The **origin** of a transportation problem is the location from which shipments are despatched.
- The **destination** of a transportation problem is the location to which shipments are transported.
- The **unit transportation cost** is the cost of transporting one unit of the consignment from an origin to a destination

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Associate Professor (Mathematics, JECRC, Jaipur

OBJECTIVES OF TRANSPORTATION PROBLEM

- Determination of a transportation plan of a single commodity
- From a number of sources
- To a number of destinations,
- Such that total cost of transportation id minimized.

Application of Transportation

- It is used to compute transportation routes in such a way as to minimize transportation cost for finding out locations of warehouses.
- It is used to find out locations of transportation corporations depots where insignificant total cost difference may not matter.
- Minimize shipping costs from factories to warehouses(or from warehouses to retail outlets).
- Determine lowest cost location for new factory, warehouse, office ,or other outlet facility.
- Find minimum cost production schedule that satisfies firms demand and production limitations.

Two Types of transportation Problems:

- **BALANCED TRANSPORTATION PROBLEM**:- Where the total supply equally total demand.
- **UNBALANCED TRANSPORTATION PROBLEM**:- Where the total supply is not equally total demand.

PHASES OF SOLUTION OF TRANSPORTATION PROBLEM:-

- **PHASE I:-** Obtains the Initial Basic Feasible Solution.
- **PHASE II:-** Obtains the Optimal Basic Solution.

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Associate Professor (Mathematics, JECRC, Jaipur

INITIAL BASIC FEASIBLE SOLUTION:-

- NORTH-WEST CORNER RULE(NWCR)
- LEAST COST METHOD(LCM)
- VOGLE APPROXIMATION METHOD(VAM)

OPTIMUM BASIC SOLUTION:-

- MODIFIED DISTRIBUTION METHOD (MODI METHOD)
- STEPPING STONE METHOD

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LEAST COST METHOD

Contents

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TRANSPORTATION PROBLEM WITH BALANCED SITUATIONS

ASSUMING THEM STORES

COST

ASSUMING THEM INDUSTRIES

Source \ To	D	E	F	Supply
A	5	8	4	50
B	6	6	3	40
C	3	9	6	60
Demand	20	95	35	150

BALANCED

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Lowest Cost Entry Method

		W_1	W_2	W_3	W_4	W_5	Supply		
From	F_1	**5** 7	6	15 4	20 5	9	40	25	5
	F_2	8	**30** 5	6	7	8	30	0	0
	F_3	**15** 6	8	9	6	**5** 5	20	15	0
	F_4	**10** 5	7	7	8	6	10	0	
Demand		30	30	15	20	5			
		20	0	0	0	0			
		5							
		0							

Cost= 35+60+100+150+90+25=Rs.510

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Vogel's Approximation Method(VAM)

	W_1	w_2	w_3	w_4	w_5	Supply	
F_1	7	6	15 4	5	9	40	(I)
F_2	8	5	6	7	8	30	(I)
F_3	6	8	9	6	5	20	(I)
F_4	5	7	7	8	6	10	(I)
Demand	30	30	15	20	5	100	
	(1)	(1)	(2)	(1)	(1)	(1)	

	w_1	w_2	w_4	w_5	Supply	
F_1	7	6	5	9	25	(I)
F_2	8	30 5	7	8	30	(2)
F_3	6	8	6	5	20	(I)
F_4	5	7	8	6	10	(I)
Demand	30	30	20	5		
	(1)	(1)	(1)	(1)		

	w_1	w_4	w_5	Supply	
F_1	7	$\boxed{20}$ 5	9	25	(2)
F_3	6	6	5	20	(1)
F_4	5	8	6	10	(I)
Demand	30	20	5		
	(1)	(1)	(1)		

	w_1	w_5	Supply	
F_1	$\boxed{5}$ 7	9	5	(2)
F_3	6	5	20	(1)
F_4	5	6	10	(1)
Demand	30	5		
	(1)	(1)		

	W_1	w_5	Supply	
F_3	6	5 (5)	20	(1)
F_4	5 (15)	6	10	(I)
Demand	25	5		
	(1)	(1)		

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15	**6**	**15**
10	5	10
	25	

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	W_1	W_2	W_3	W_4	W_5	
F_1	**5** 7	6	15 4	20 5	9	40
F_2	8	**30** 5	6	7	8	30
F_3	**15** 6	8	9	6	**5** 5	20
F_4	**10** 5	7	7	8	6	10
	30	30	15	20	5	

Cost= 35+60+100+150+90+25=Rs.510

Solve Transportation Problem by VAM Method

Source \ To	D	E	F	Supply
A	5	8	4	50
B	6	6	3	40
C	3	9	6	60
Demand	20	95	35	150

ANS:955

Dr. Kashish Parwani
Associate Professor (Mathematics) JECRC, Jaipur

References:

1. https://www.slideshare.net/VishalHotchandani2/transportation-problems-183454172
2. Optimization Techniques for Engineering by Nilama Gupta

Dr. Kashish Parwani
Associate Professor (Mathematics) JECRC, Jaipur