

12th Maths : Examples on Assignment Problem:

- 1) A job production unit has four jobs A, B, C, D which can be manufactured on each of the four machines P, Q, R & S. the processing cost of each job for each machine is given below:

Jobs	Machines			
	P	Q	R	S
	Processing cost (Rs.)			
A	31	25	33	29
B	25	24	23	21
C	19	21	23	24
D	38	36	34	40

How the job should be assigned to machines so that the total processing cost is minimum.

- 2) A computer centre has four expert programmers. The centre needs four application programmers to be developed. The head of the computer centre, after studying carefully the programmers to be developed, estimates the computer time in minutes required by the respective experts to develop the application programmes as follows:

Programmers	Programmers			
	1	2	3	4
	(Time in minutes)			
A	120	100	80	90
B	80	90	110	70
C	110	140	120	100
D	90	90	80	90

How the head of computer centre assign the programmers to the programmers so that the total time required is minimum?

- 3) A Workshop has four machines and four task for completion. Each of the machines can perform each of the four tasks. Time taken at each of the machines to complete each task is given in the matrix given below:

Task	Machines			
	A	B	C	D
	Processing time (Hrs.)			
I	51	80	49	62
II	32	39	59	75
III	37	49	70	61
IV	55	60	58	62

How should the tasks be assigned to machines to minimize requirement of machine hours?

- 4) Three different aeroplanes are to be assigned to handle three cargo consignments with a view to maximize profit. The profit matrix (in lakhs) of Rs. is as follows:

Aeroplanes	Cargo Consignment		
	C ₁	C ₂	C ₃
C ₁	1	4	5
C ₂	2	3	3
C ₃	3	1	2

How should the cargo consignments be assigned to aeroplanes to minimize the profit?

- 5) A Pharmaceutical company has four branches, one at each city A, B, C, and D. A branch manger is to be appointed one at each city, out of four candidates P, Q, R and S. the monthly business depends upon the city and effectiveness of the branch manager in that city.

Branch Manager	City			
	A	B	C	D
	Monthly business (Rs. lakhs)			
P	11	11	9	9
Q	13	16	11	10
R	12	17	13	8
S	16	14	16	12

Which manger should be appointed at which city so as to get minimize total monthly business?

- 6) Five different machines can do any of the five required jobs, with different profits resulting from each assignment as shown below:

Jobs	Machines				
	A	B	C	D	E
	Profits (in Rs.)				
1	30	37	40	28	40
2	40	24	27	21	36
3	40	32	33	30	35
4	25	38	40	36	36
5	29	62	41	34	39

Find out maximum profit possible through?

- 7) The following matrix shows the time in hours taken by five mechanics A, B, C and D and E

while working on five lathe machines M_1, M_2, M_3, M_4 & M_5 in completing a certain job. How should, the foreman, assign the machines to mechanics so that the total time may be minimized?

Machines	Machines				
	M_1	M_2	M_3	M_4	M_5
A	1	3	2	8	6
B	2	4	3	1	5
C	5	6	3	4	6
D	3	1	4	2	2
E	1	5	6	5	4

8) A departmental head has three subordinates and four tasks for completion. The employees differ in their work contents. With the performance matrix given below, which three of the four tasks should be assigned to the subordinates?

Tasks	Subordinates		
	I	II	III
A	9	12	11
B	8	13	17
C	20	12	13
D	21	15	17

9) In the modification of plant-layout of a factory four new machines M_1, M_2, M_3 and M_4 are to be installed in machine shop. There are five vacant places A, B, C, D and E available. Due to limited space, machine M_2 cannot be placed at C and machine M_3 cannot be placed at A. the cost of locating of various machines in various vacant places is given in the following cost matrix (in Rs.). Find the optimal assignment schedule.

Machines	Places				
	A	B	C	D	E
M_1	9	11	15	10	11
M_2	12	9	-	10	9
M_3	-	11	14	11	7
M_4	14	8	12	7	8

10) Solve the following restricted assignment problem to minimize the overall effectiveness.

Persons	Job			
	1	2	3	4
A	-	2	2	5
B	2	-	4	4

C	1	2	-	2
D	2	4	3	-

11) A company has one surplus car each in cities P, Q, R and S and one deficit car each in cities A, B, C and D. the distances in kilometers between the cities are shown below:

From	To			
	A	B	C	D
P	8	5	8	2
Q	9	3	6	9
R	4	10	7	4
S	3	5	6	1

The management wishes to determine the assignment of surplus car to the cities with a deficit to minimize the total kilometers traveled. Give alternate optimal assignment if possible. Compute the total distance for optimum assignment.

12) A department head has four subordinates and four tasks have to be performed. Subordinates differ in efficiency and tasks differ in their intrinsic difficulty. The time required by each subordinates to perform each task is given in the following effectiveness matrix. How the tasks should be allocated to each person so as to minimize the total man-hours?

Tasks	Subordinates			
	1	2	3	4
A	8	26	17	11
B	13	28	4	26
C	38	19	18	15
D	19	26	24	10

13) A car hire company has one car at each five depots I, II, III, IV and V. a customer requires a car in each town namely A, B, C, D, E. distance between deposits (in kms) and towns are given in the following distance matrix.

Towns	Depots				
	A	B	C	D	E
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

How should cars be assigned to customers so as to minimize the total distance traveled?