HARCOURT BUTLER TECHNICAL UNIVERSITY, KANPUR

ASSSIGNMENT - 2/OPERATIONS RESEARCH / Unit-2 /BMA-341/342

III -B.Tech. - ME/CS 2021-22

1. Discuss the importance of integer programming problem in optimization theory and explain Gomory's method for solving an all IPP**.**

2. Obtain an initial basic feasible solution of the following transportation problem using Vogel's approximation method.
Is this solution an optimal solution? If not, obtain the optimal solution

Destination--> Source ↓	W_1	W_2	W_3	W_4	Availability (a_i)
F_1	19	30	50	10	7
F_2	70	30	40	60	9
F_3	40	8	70	20	18
Demand (b_j)	5	8	7	14	34

3. Define a transportation problem. Briefly describe the steps of the Vogel's approximation method to obtain an initial basic feasible solution.

4. Table below gives the relevant data of a transportation problem :

Source	Destinations				Availability
	D_1	D_2	D_3	D_4	
	Transportation cost per unit(Rs.)				
S_1	17	11	45	30	15
S_2	18	19	14	31	13
Demand	9	6	7	6	28

(a) Obtain an initial basic feasible solution using Vogel's approximation method.
(b) Using a suitable method, carry out one iteration to obtain an improved solution.

5. Give the generalized mathematical formulation of an Assignment problem. Give a comparative study of TP and AP.

6. A departmental head has four sub- ordinates, and four tasks to be performed. The sub-ordinates differ in efficiency and the tasks differ in their intrinsic difficulty. His estimate, of the time each man would take to perform each task, is given in the following matrix below:

Tasks	Men			
	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

How should the tasks be allocated, one to a man, so as to minimize the total man hours?

7. There are four jobs to be assigned to 5 machines. Only one job could be assigned to one machine. The amount of time in hours required for the jobs in a machine are given in the following matrix.

Machine / Jobs	A	B	C	D	E
1	4	3	6	2	7
2	10	12	11	14	16
3	4	3	2	1	5
4	8	7	6	9	6

Find the optimum assignment of jobs to the machines to minimize the total processing time and also find out to which machine no job is assigned. What is the total processing time to complete all the jobs?

8. Given the matrix of set-up costs, Show how to sequence the production so as to minimize the set up cost per cycle.

	A	B	C	D	E
A	∞	2	4	7	1
B	6	∞	2	8	2
C	8	7	∞	4	7
D	12	4	6	∞	5
E	1	3	2	8	∞

9. Solve the integer programming problem;

$$Max\ z = 7x_1 + 9x_2$$
$$Subject\ to\ constraints:\ -x_1 + 3x_2 \leq 6,$$
$$7x_1 + x_2 \leq 35, \quad x_1, x_2 \geq 0\ are\ integers.$$

10. Describe Branch and bound method for solving an Integer programming problem.

11. Explain the geometrical interpretation of Branch and Bound method by solving the following I.P.P.:

$$Max\ z = x_1 + x_2$$
$$Subject\ to\ constraints:\ 3x_1 + 2x_2 \leq 12,$$
$$x_2 \leq 2, \qquad x_1, x_2 \geq 0\ are\ integers.$$

12. Determine the optimum basic feasible solution to the following transportation problem:

	D_1	D_2	D_3	D_4	Capacity
O_1	1	2	3	4	6
O_2	4	3	2	0	8
O_3	0	2	2	1	10
Demand	4	6	8	6	