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K-1058

M.A./M.Sc. Final Examination, 2022

OPERATION RESEARCH

[Paper : Eighth (Optional)]

Time Allowed : Three Hours

Maximum Marks : 100

Minimum Passing Marks : 36

Note : Attempt **any five** questions. All questions carry equal marks.

1. Use Dual Simplex Method to solve the following linear programming problem :

Maximize $z = -2x_1 - x_2$

Subject to the constraints $3x_1 + x_2 \geq 3$

$4x_1 + 3x_2 \geq 6$

$$x_1 + 2x_2 \geq 3$$

$$x_1, x_2 \geq 0$$

2. Find an optimum solution to the following transportation problem :

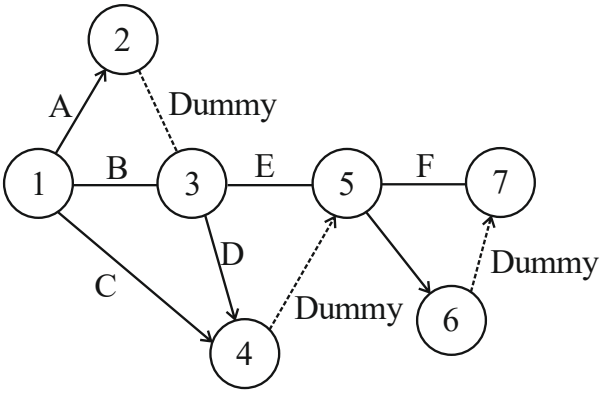
	Warehouse				
Factory	D	E	F	G	Capacity
A	42	48	38	37	160
B	40	49	52	51	150
C	39	38	40	53	190
Demand	80	90	110	100	

3. A company has 4 machines to do 3 jobs. Each job can be assigned to one and only one machine. The cost of each job on each machine is given in the following table :

	Machine			
Job	A	B	C	D
1	18	24	28	32
2	8	13	17	19
3	10	15	19	22

Determine the optimum assignment.

4. A project is represented by the network shown below and has the following data :



Activity	Activity Duration (days)
A	4
B	7
C	6
D	5
E	7
F	6
G	5

Calculate total float for each activity and highlight the critical path.

5. Solve the following linear programming problem by the bounded algorithm :

Maximize $z = 2x_1 + x_2$

Subject to the constraints $x_1 + 2x_2 \leq 10$

$x_1 + x_2 \leq 6$

$x_1 - x_2 \leq 2$

$x_1 - 2x_2 \leq 1$

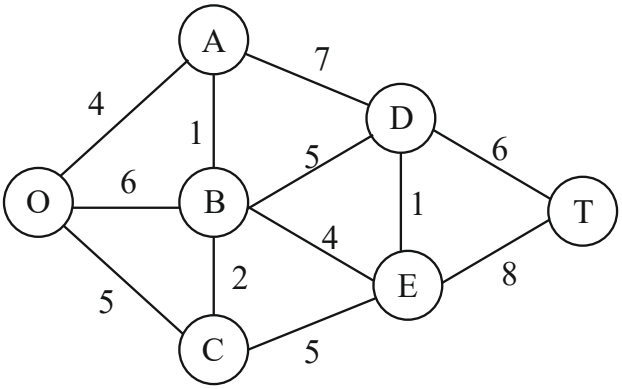
$0 \leq x_1 \leq 3$

$0 \leq x_2 \leq 2$

6. Write a note on parametric linear programming problem.

7. What are the major characteristics of PERT model?

8. Consider the following network where the numbers on links represent actual distance between the corresponding nodes. Find the minimal spanning tree



9. Write down the dual of the following linear programming problem and solve

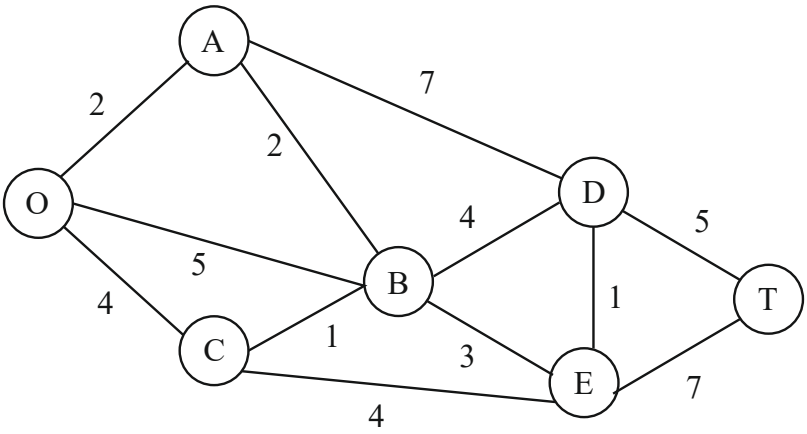
Minimize $z = 15x_1 + 10x_2$

Subject to the constraints $3x_1 + 5x_2 \geq 5$

$5x_1 + 2x_2 \geq 3$

$x_1, x_2 \geq 0$

10. Use Dijkstra's labelling procedure to determine the shortest path between node O to node T (length is in miles)



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