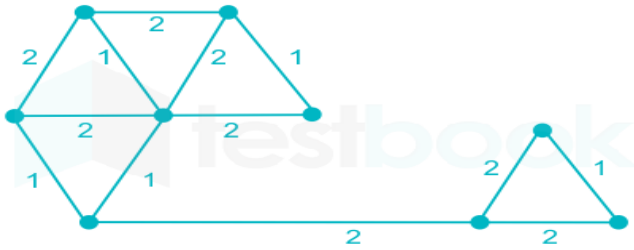
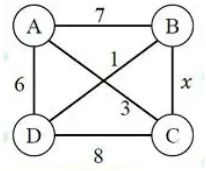
Assignment-II

1. Find the absolute minimum value of the function $f(x, y) = x^2 + y^2$ subject to the constraint $x^2 + 2y^2 = 1$.
2. A firm manufactures a commodity at two different factories. The total cost of manufacturing depends on the quantities, p and q supplied by each factory, and is expressed by the joint cost function $2pq^2 + pq + 22q + 500$. The company's objective is to produce 200 units, while minimizing production costs. How many units should be supplied by each factory?
3. Find the maximum possible weight of the minimum spanning tree of a graph with four vertices and six edges having weights $6,\ 7,\ 4,\ 8,\ 11,\ 9$.
4. A manufacturer produces two types of product x and y. The profit is given by $2x + 3y$. What will be the maximum profit if the constraints are $x + 3y \leq 40,\ 3x + y \leq 24,\ x + y \leq 10,\ x > 0, y > 0$. Use graphical method.
5. Use graphical method to solve the following LPP. $Max\ Z = 3x + 2y$ Subject to $5x + y \geq 10,\ x + y \geq 6,\ x + 4xy \geq 12,\ x, y \geq 0$.
6. Use graphical method to solve the following LPP. $Max\ Z = x + y$ Subject to $x + y \leq 10,\ x + y \geq 3,\ x, y \geq 0$.
7. Use simplex method to solve the following LPP. $Max\ Z = 3x + 2y$ Subject to $x + 3y \leq 40, 3x + y \leq 24, x + y \leq 10, x > 0, y > 0$
8. The number of distinct minimum spanning trees for the weighted graph below is _____



9. The maximum value of x such that the edge between the nodes B and C is included in every minimum spanning tree of the given graph is _____.



10. Suppose there are two bowls of cookies. Bowl 1 contains 30 vanilla cookies and 10 chocolate cookies. Bowl 2 contains 20 of each. Now suppose you choose one of the bowls at random and, without looking, select a cookie at random. The cookie is vanilla. What is the probability that it came from Bowl 1 ?

11. Three prisoners, A, B, and C, are in separate cells and sentenced to death. The governor has selected one of them at random to be pardoned. The warden knows which one is pardoned, but is not allowed to tell. Prisoner A begs the warden to let him know the identity of one of the two who are going to be executed. If B is to be pardoned, give me C's name. If C is to be pardoned, give me B's name. And if I'm to be pardoned, secretly flip a coin to decide whether to give me the name B or C. The warden gives him B's name. What is the probability of A's

chance of being pardoned after knowing the Warden's information ? Also, find the probability of C's chance of being pardoned after knowing the Warden's information.

12. If it's sunny today, there is a 70% chance it will be sunny tomorrow and 30% chance it will rain. If it's rainy today, there is a 60% chance it will be sunny tomorrow and 40% chance it will continue to rain. Represent the situation as a transition matrix. Also if it is sunny today, calculate the probability that it will be sunny after two days.

13. A company has two states:
Good(G): The company is profitable and
Bad(B): The company is making a loss.

If the company is in good state today there is an 80% chance it will remain in Good state tomorrow and 20% chance that it will move to Bad state. If the company is in a Bad state today, there is a 50% chance that it will remain in a bad state and 50% chance that it will move to a Good state. Derive the transition matrix for this system. Also calculate the probability that if today the company is in Good state, then after two days it will be in Good days.