PRACTICE QUESTIONS

Q1.In how many of the distinct permutations of the letters in MISSISSIPPI do the four is not come together?

Q2.How many 5-digit telephone numbers can be constructed using the digits 0 to 9, if each number starts with 67 and no digit appears more than once?

Q3.A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has?
(i) No girls

(ii) At least one boy and one girl

(iii) At least three girls

Q4.From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done?

Q5. In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together?

Q6.How many 4-letter words with or without meaning, can be formed out of the letters of the word, 'LOGARITHMS', if repetition of letters is not allowed?

Q7.One card is drawn from a deck of 52 cards, well-shuffled. Calculate the probability that the card will

(i) Be an ace,

(ii) Not be an ace.

Q8.Consider the experiment of rolling a die. Let A be the event ‘getting a prime number’, B be the event ‘getting an odd number’. Write the sets representing the events

(i) A or B

(ii) A and B

(iii) A but not B

(iv) ‘Not A’

Q9.A coin is tossed three times, consider the following events.

P: ‘No head appears’,

Q: ‘Exactly one head appears’ and

R: ‘At Least two heads appear’.

Check whether they form a set of mutually exclusive and exhaustive events.

Q10.Two dice are thrown together. What is the probability that the number obtained on one of the dice is multiple of number obtained on the other dice?

Q11. If R = {(x, y): x + 2y = 8} is a relation in N, write the range of R.

Q12. Show that the function f: N → N given by f(x) = 2x is one-one but not onto.

Q13. If f: R → R is defined by f(x) = 3x + 2 find f (f(x)).

Q14. Show that the relation R on R defined as R = {(a, b): a ≤ b}, is reflexive and transitive but not symmetric.

Q15. If A = {-1, 2, 3} and B = {1, 3}, then determine
(i) AxB (ii) BxC (c) BxB (iv) AxA

Q16. If A={x: x∈ W, x < 2}, 5 = {x: x∈N, 1 <.x < 5}, C= {3, 5}. Find
(i) Ax (B∩Q) (ii) Ax (B∪C)

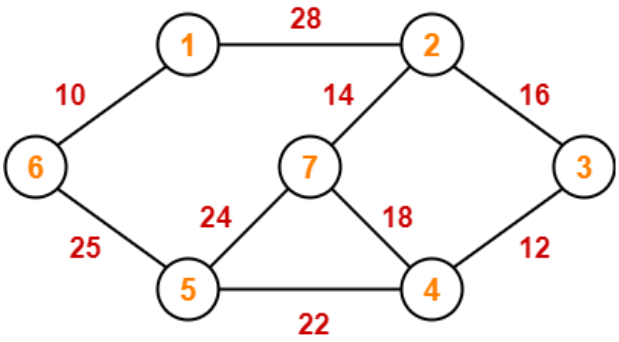
Q17. A class is going to elect one male and one female representative. There are 12 boys in the class and 13 girls. How many possible pairs of representatives can the class elect?

Q18.There are 5 multiple choice questions in the test. If the first three questions have 4 choices each and the next two have 5 choices each, the number of answers possible is

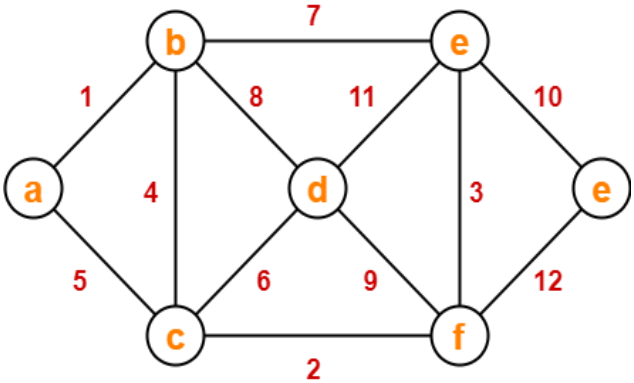
Q19. Name some common type of Graph with Example

Q20. Difference between Prim's Algorithm and Kruskal's Algorithm-

Q21. Construct the minimum spanning tree (MST) for the given graph using Prim's Algorithm-



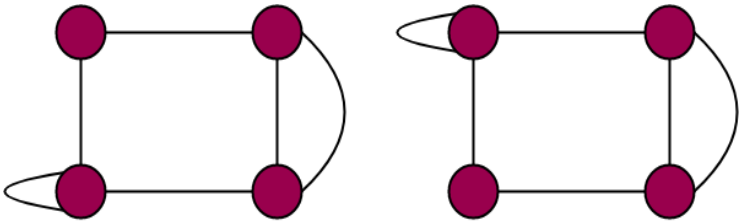
Q22. Using Prim's Algorithm, find the cost of minimum spanning tree (MST) of the given graph-



Q23. During a month with 30 days, a cricket team plays at least one game a day, but no more than 45 games. There must be a period of some number of consecutive days during which the team must play exactly _____ number of games.

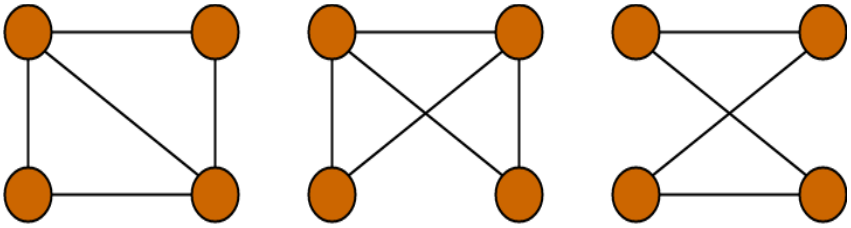
Q24. A drawer contains 12 red and 12 blue socks, all unmatched. A person takes socks out at random in the dark. How many socks must he take out to be sure that he has at least two blue socks?

Q25. Are the following two graphs isomorphic?



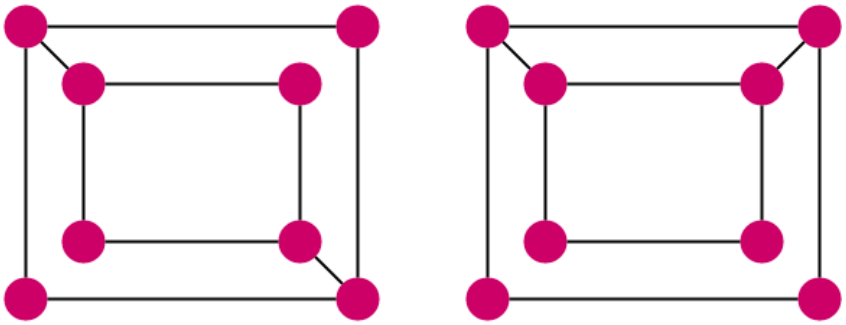
G1 G2

Q26. Which of the following graphs are isomorphic?



G1 G2 G3

Q27. Are the following two graphs isomorphic?



G1 G2

Q28. Explain the steps in Dijkstra's shortest path algorithm

Q29. Define: i) Spanning Tree ii) Rooted Tree. Give one example for each.

Q30. Define Trees, Prove that a tree with n-vertices has n-1 edges.

Q31. State and prove the principle of Inclusion - Exclusion for n sets.

Q32. In how many ways can one distribute eight identical balls into four distinct containers so that

i) No container is left empty?
ii) The fourth container gets an odd number of balls?

Q33. Two fair dice are rolled. What is the probability that their sum is greater than 4?

Q34. A jar contains 12 marbles: 4 red, 5 blue, and 3 orange. If you pull 3 marbles without replacement, what is the probability of getting all three colors in the order of blue, orange, red? What is the probability of getting all orange?

Q35. Among 50 patients admitted to a hospital, 25 are diagnosed with pneumonia, 30 with bronchitis, and 10 with both pneumonia and bronchitis. Determine:

(a) The number of patients diagnosed with pneumonia or bronchitis (or both).
(b) The number of patients not diagnosed with pneumonia or bronchitis**.**

Q36. A large software development company employs 100 computer programmers. Of them, 45 are proficient in Java, 30 in C#, 20 in Python, six in C# and Java, one in Java and Python, five in C# and Python, and just one programmer is proficient in all three languages above. Determine the number of computer programmers that are not proficient in any of these three languages.

Q37. There are 350 farmers in a large region. 260 farm beetroot, 100 farm yams, 70 farm radish, 40 farm beetroot and radish, 40 farm yams and radish, and 30 farm beetroot and yams. Let B, Y, and R denote the set of farms that farm beetroot, yams and radish respectively. Determine the number of farmers that farm beetroot, yams, and radish.

Q38. Let AA, BB, CC be three sets as shown in the following Venn diagram. For each of the following sets, draw a Venn diagram and shade the area representing the given set.

1. $A \cup B \cup C$
2. $A \cap B \cap C$
3. $A \cup (B \cap C)$
4. $A - (B \cap C)$
5. $A \cup (B \cap C)^c$

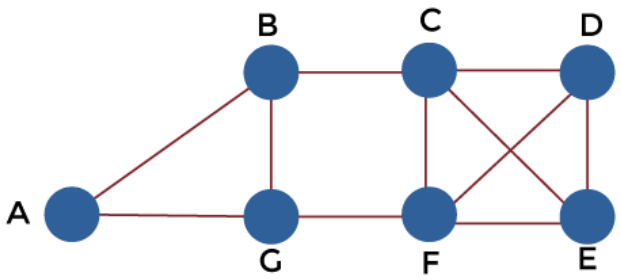
Q39. Using Venn diagrams, verify the following identities.

1. $A=(A \cap B) \cup (A-B) A=(A \cap B) \cup (A-B)$
2. If AA and BB are finite sets, we have

$$|A \cup B| = |A| + |B| - |A \cap B|$$

Q40.Difference between walk, path, trail and circuit in graph theory

Q41.Consider a graph:

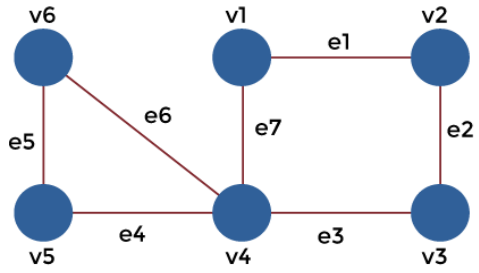


Find out which sequence of the vertices determines walks. The sequence is described below:

1. A, B, G, F, C, D
2. B, G, F, C, B, G, A
3. C, E, F, C
4. C, E, F, C, E
5. A, B, F, A
6. F, D, E, C, B

For those sequences which are walk, we have to also determine whether it is a cycle, path, circuit, or trail.

Q42. Consider a graph:



With the help of below sequences, we have to determine the nature of walk in each case:

1. v1, e1, v2, e2, v3, e2, v2
2. v4, e7, v1, e1, v2, e2, v3, e3, v4, e4, v5
3. v1, e1, v2, e2, v3, e3, v4, e4, v5
4. v1, e1, v2, e2, v3, e3, v4, e7, v1
5. v6, e5, v5, e4, v4, e3, v3, e2, v2, e1, v1, e7, v4, e6, v6

Q43.compute first four terms of the sequence defined by following recurrence relation:

a). $a_n = na_{n-1} + n^2 a_{n-2}$ $(n >= 2)$

$a_n = 1$ for n=0

$a_n = 1$ for n=0

Q44. What is Universal and Existential Quantifier explain with example and denote their symbol and also indicate phrase that is used for them.

Q45**.** Assume that A = {1, 2, 3,…, 14}. Define a relation R from A to A by R = {(x, y): 3x – y = 0, such that x, y ∈ A}. Determine and write down its range, domain, and codomain.

Q46. Find the domain and range of the real function $f(x) = x/1+x^2$.

Q47. Draw the graph of the function f: R → R defined by $f(x) = x^3$, x ∈ R

Q48. Let A = {1, 2, 3}, B = {4} and C = {5}

- (i) Verify that: A x (B – C) = (A x B) – (A x C)
- (ii) Find (A x B) ∩ (A x C)

Q49. There are 5 green 7 red balls. Two balls are selected one by one without replacement. Find the probability that first is green and second is red.

Q50. In a lottery, there are 10 prizes and 25 blanks. A lottery is drawn at random. What is the probability of getting a prize?