1	Every Isomorphic graph must have _____representation.	solved
2	What is the minimum number of edges needed to generatee the connectivity in a simple graph with 10 vertices?	By the formula n(n-1)/2 E = 45
3	What is a chromatic index?	solved
4	A minimal spanning tree of graph G is	solved
5	A graph contains 21 edges & 3 vertices of degree 4 & all the other vertices of degree 2. Find out the total number of vertices.	solved
6	A graph has 24 edges & degree of each vertex is K then which of the following is possible no. Of vertices.	solved
7	Minimum no. of vertices possible in a simple graph with 41 edges & degree of each vertex is at most 5.	
8	How many simple non-isomorphic graph are possible when number of vertices are 3?	solved
9	How many simple non-isomorphic graph are possible when number of vertices are 5 & edges are 3?	
10	Let G be a planar graph with v=10, E=9 & three are components then number of possible regions R are?	solved
11	Maximum number of regions R are possible in a simple planar graph with 10 edges are?	solved
12	a simple graph is	A simple graph is a graph that does not have more than one edge between any two vertices and no edge starts and ends at the same vertex
13	What is the number of edges present in a complete graph having n vertices?	(n*(n-1))/2

14	Vertices with maximal eccentricity is called	The maximum eccentricity from all the vertices is considered as the diameter of the Graph G. The maximum among all the distances between a vertex to all other vertices is considered as the diameter of the Graph G.
15	A connected planar graph having 6 vertices, 7 edges contains _____ __ regions.	By formula e- f= 2+r It contains 3 regions
16	If a simple graph G, contains n vertices and m edges, the number of edges in the Graph G'(Complement of G) is _____	The union of G and G' would be a complete graph so, the number of edges in G'= number of edges in the complete form of G(nC2)- edges in G(m). So (n*n-n-2*m)/2
17	A simple graph not hold?	A simple graph maybe connected or disconnected.
18	What is the maximum number of edges in a bipartite graph having 12 vertices?	solved
19	What is graph?	a mathematical object consist of a set of 1. V - NODES (VERTICES, POINTS), 2. E - EDGES BETWEEN PAIR OF NODES
20	What must be the ideal size of array if the height of tree is 'h'?	2^h - 1
21	What is the parent for a node 'w' of a complete binary tree in an array representation when w is not 0?	Floor of w-1/2 because we can't miss a node
22	Maximum number of node in complete binary tree of height 5 and root is at height 0.	By formula 2^h -1 So ans is 63
23	A connected planar graph having 10 vertices, 15 edges contains how may bounded regions.	solved
24	Every Isomorphic graph must have _____represen tation.	adjacency matrix representation
25	A complete n-node graph Kn is planar if and only if _____	Any graph with 4 or less vertices is planar, any graph with 8 or less edges is planar and a complete n-node graph Kn is planar if and only if $n \leq 4$.
26	A 4- regular graph have 10 edges. The number of vertex in the graph is	solved
27	If G is simple graph with 15 edges and complement of G has 13 edges then how many vertex in G	solved

28	A 3- regular graph have 8 vetex . The number of Edges in the grapg is	solved
29	A non directed graph contain 16 edges and all vertices are of dgree 2, then the number of vertex in G is	solved
30	The _____of a graph G consists of all vertices and edges of G.	eulerian circuit
31	A _____in a graph G is a circuit which consists of every vertex (except first/last vertex) of G exactly once.	Hamiltonian path
32	A graph with no edges is known as Empty graph. Empty graph is also known as_____?	Empty graph is also known as **trivial graphs**
33	A graph G is called a _____. If it is a connected acyclic graph.	a Tree
34	In a graph if e=(u,v) means	u is adjacent to v but v is not adjacent to u.
35	A graph with n vertices will definitely have a parallel edges or self loop if the total number of edges are?	A graph with n vertices will definitely have a parallel edge or a self loop if the total number of edges are greater than n−1.
36	A vertex of a graph G is called even or odd depending upon	the vertex of a graph is called even or odd based on its degree.
37	A continuous non intersecting curve in the plan whose origin & terminus coincide	jordan graph
38	A graph with n vertices will definitely have a parallel edge or self loop of the total number of edges are	A graph with n vertices will definitely have a parallel edge or a self loop if the total number of edges are greater than n−1.
39	The maximum degree of any vertex in a simple graph with n vertices is	n- 1
40	Circle has_____	no vetices
41	A graph is tree if and only if	A graph is a tree if and only if there is exactly one path between every pair of its vertices
42	The complete graph with 4 vertices has k degrees where k is	3

43	Length of the walk of a graph G is	The total number of edges covered in a walk is called as Length of the Walk.
44	The number of leaf nodes in a complete binary tree of depth d is	2^d
45	An undirected graph possesses an eulerian circuit if and only if it is connected & it's vertices are	An undirected graph has an Eulerian path if and only if it is connected and has either zero or two vertices with an odd degree. If no vertex has an odd degree, then the graph is Eulerian.
46	In an undirected graph the number of nodes with odd degree must be	even
47	Eccentricity of a vertex is denoted by e(v) is defined by_____?	max { d(u,v): u belongs to v, u does not equal to v : where d(u,v) is the distance between u&v}
48	If some positive integer k, degree of vertex d(v)=k for every vertex v of the graph G, then G is called_____?	K - regular graph
49	Consider undirected random graph of eight vertices & edges between pair of vertices is 1/2. What is the expected number of unoredered cycles of length three?	solved
50	Let G be an undirected complete graph on n vertices, where n>2. Then, the number of different Hamiltonian cycles in graph G is equal to	(n-1)! / 2
51	In a connected graph, a bridge is an edge whose removal disconnects a graph. Which of the statements is true?	bridge cannot be part of a simple cycle
52	An ordered n-tuples (d1,d2,d3,.....dn) and d1>=d2>=d3>= >=dn is called graphics, if there exists a simple undirected graph with n vertices having degree d1,d2,d3, dn respectively. Which of the following 6-tuples is not graphics?	<3, 3, 3, 1, 0, 0> is not graphic.

53	A cycle on n vertices is isomorphic to it's complement. The value of n is_____	5
54	Let grapg G=(V,E) be a directed graph where V is set of vertices & E is set of edges. Then which one of the following graph has the same strongly connected components as graph G	G2 = (V, E2) where E2 = {(u, v) | (v, u) ∉ E}
55	The number of edges in a regular graph of degree d & n vertices is	nd/2
56	Let G be a connected planar graph with 10 vertices. If the number of edges on each face is three, then the number of edges in grapg G is_____	solved
57	A graph is self complementary if it is isomorphic to its complement. For all self complementary graph on n vertices, n is_____	Congruent to 0 mod 4, or 1 mod 4
58	Consider an undirected graph G where self-loops are not allowed. The vertex set of G is {(i,j):1<=i<=12 & 1<=j<=12}. There is an edge between (a,b) and (c,d) if |a-c|<=1 & |b-d|<=1. The number of edges in this graph is_____	506
59	How many edges will a tree consisting of N nodes have?	In order to have a fully connected tree it must have N-1 edges
60	If x is a set and the set contains an integer which is neither positive nor negative then the set x is _____.	Set is both Non- empty and Finite.
61	graphs are necessarily connected?	no
62	What is the minimum number of edges needed to generatee the connectivity in a simple graph with 10 vertices?	MIN edges = n-1 So ans is 9 (doubt)

63	Minimum & Maximum number of edges are necessary in a simple graph with 10 vertices & 3-components	The minimum number of edges in any simple connected graph is "n-1" for "n" vertices. But here you have 3 components then you need to divide it in 3 parts let it be |C1|=8, |C2|=1 and |C3|=1 these are the no. of vertices in the components. So C1 will have 7 edges(i.e. n-1) and other 2 will not have any edges so total 7 edges are here. You can divide the graph in any other way also the result will be same for 3 components. The maximum number of edges in any simple graph is nC2 so you see larger the value of "n" more the no. of edges. So for 3 components you can take at most 8 vertices in any one component and other 2 have only 1 vertex each and hence 8C2 will give 28 edges in the first component and other two components will have 0 edges. Therefor, there are total 28 edges maximum.
64	The Graph G be a graph with n vertices & k components. If we delete a vertex in graph G then the number of components in graph G should be lie between.	Minimum: The removed vertex itself is a separate connected component. So removal of a vertex creates k-1 components. Maximum: It may be possible that the removed vertex disconnects all components. For example the removed vertex is center of a star. So removal creates n-1 components.
65	What is chordal?	, a chordal graph is one in which all cycles of four or more vertices have a chord, which is an edge that is not part of the cycle but connects two vertices of the cycle
66	Spanning trees can be created by removing how many edges from a cycle	by removing maximum e - n + 1 edges, we can construct a spanning tree.
67	Every Plannar graphs can be colored in at most ___colors	at most four colors
68	(I) Every regular graph is Plannar, (II) Every k-Regular graph have euler circuit if k is even	1. false 2. false
69	Minimal Cut Set in any complete graph of n vertices have how many edges	
70	Minimal Cut Set in any cycle graph of n vertices have how many edges	
71	Every Isomorphic graph must have _____represe ntation.	adjacency matrix representation
72	A bridge can not be a part of _____	bridge cannot be part of **a cycl**e
73	A graph G is called_____if it is connected cyclic graph	A graph G is called a Tree if it is a connected acyclic graph
74	(I) A connected graph cannot have isolated vertex (II) A disconnected graph should have pendant vertex true or false	1. false 2. true doubt
75	Maximum degree of a vertex in a cycle of n vertices	In a Cycle Graph, Degree of each vertex in a graph is two

76	(I) Every Bipartite graph is tree & Every tree is bipartite graph (II) If a graph has no cycle then it is bitartite graph	1. false 2. false
77	Cut set of a cycle of n vertices can have how many maximum edges	the maximum number of cut edges possible is 'n-1'.
78	(I) In a graph, all the edges have same edge weights then minimum spanning tree cannot be unique. (II) Total Spanning tree of a K4 is 15	1. true 2. false
79	(I) There can be 2 centers in a tree (II) There can be two centers in cyclic graph	1. true 2.
80	(I) A closed walk can not be cycle. (II) Euler circuit is a Trail	1. true 2. true
81	(I) Bridge can have more than one edge. (II) Matching number is lagest maximal matching	1. true 2.false
82	A minimal spanning tree of graph G is	A minimum spanning tree or minimum weight spanning tree is a subset of the edges of a connected (un)directed edge-weighted graph that connects all the vertices together, without any cycles and with the minimum total edge weight possible
83	Consider a weighted undirected graph with positive edge weights and let (u,v) be an edge in the graph. It is known that the shortest path from source vertex s to u has 53 & shortest path from s to v has weight 65. Which statement is always true	weight (u, v) ≥ 12
84	The complete graph k, has _____different spanning trees?	Spanning trees in complete graph is equal to n ^(n-2)(where n is no of sides or regularity in complete graph).
85	n a connected graph, a bridge is an edge whose removal disconnects a graph. Which of the statements is true?	A bridge cannot be part of a simple cycle
86	A graph is self complementary if it is isomorphic to its complement. For all self complementary graph on n vertices, n is_____	Congruent to 0 mod 4, or 1 mod 4
87	a spanning tree of a graph G?	A spanning tree is **a subset of Graph G**, which has all the vertices covered with minimum possible number of edges.
88	Consider a complete graph G with 4 vertices. The graph G has _____ spanning trees.	A graph can have many spanning trees. And a complete graph with n vertices has n(n-2) spanning trees. So, the complete graph with 4 vertices

		has 4^(4-2) = 16 spanning trees. advertisement
89	The travelling salesman problem can be solved using _____	travelling salesman problem can be solved by contracting the minimum spanning tree
90	Consider a undirected graph G with vertices { A, B, C, D, E}. In graph G, every edge has distinct weight. Edge CD is edge with minimum weight and edge AB is edge with maximum weight. Then, which of the following is false?	No minimum spanning tree contains AB
91	it is not the algorithm to find the minimum spanning tree of the given graph?	Bellman–Ford algorithm
92	How many non-isomorphic graphs are possible with 6 vertices and 6 edges and degree of each vertex is 2?	
93	Every isomorphic graph must have_____ _____ representation.	adjacency matrix representation
94	A cycle on n vertices is isomorphic to its complement. What is the value of n?	5
95	How many perfect matchings are there in a complete graph of 10 vertices?	So for n vertices perfect matching will have n/2 edges and there won't be any perfect matching if n is odd. For n=10, we can choose the first edge in 10C2 = 45 ways, second in 8C2=28 ways, third in 6C2=15 ways and so on. So, the total number of ways 45*28*15*6*1=113400. But perfect matching being a set, order of elements is not important and the permutations 5! of the 5 edges are same only. So, total number of perfect matching is 113400/5! = 945.
96	A complete n-node graph Kn is a planar if and only if_____	Kn is planar if and only if $n \leq 4$.
97	A graph is_____if and only if it does not contain a subgraph homomorphics to K5 or K3,3	planar graph
98	An isomorphism of graphs G & H is a bijection if the vertex set of G & H. Such that any two vertices u & v of graph G are adjacent in graph G if and only if_____	f(u) and f(v) are adjacent in H
99	What is the grade of a planar graph consisting of 8 vertices & 15 edges? (Hint:-2*no. Of edges)	If G is a planar graph with n vertices and m edges then r(G) = 2m i.e. the grade or rank of G is equal to the twofold of the number of edges in G. So, the rank of the graph is 2*15=30 having 8 vertices and 15 edges.

100	A_____is a graph with no homomorphism to any proper subgraph.	core
101	What is the difference between Graph and Tree	Root node Furthermore, one other major difference between tree and graph is that there is a root node in the tree while there are no root nodes in a graph. Loops Moreover, the presence of loops is another difference between tree and graph. There are no loops in a tree while there can be loops in a graph. Complexity Besides, a graph is more complex than a tree. Conclusion Tree and graph are two nonlinear data structures. The main difference between tree and graph is that a tree organizes data in the form of a tree structure in a hierarchy while a graph organizes data as a network.
102	Graphs can be ..... and	
103	Graphs contains	verices and edges
104	Graphs can be tree but Tree cannot Graph, State True or False	false
105	Binary Tree contains two or more child node, State True or False	false
106	Always, Binary Tree contains two child node, State True or False	TRUE
107	Sometimes, Binary Tree contains less than two child node, State True or False	TRUE
108	Binary Tree and Binary Search Tree both are different, State True or False	TRUE
109	With the help of Binary Search Tree, we search particular item. State True or False	TRUE
110	If any edge having starting and ending point is same, it is called as	Closed walk
111	If any edges start and end with same pair of vertices then these two edges called as	adjacent
112	What is simple graph	a graph in which each edge connects two different vertices and where no two edges connect the same pair of vertices is called as simple graph

113	What is Multi Graph	graphs thay may have multiple edges connecting the same vertices are called multigraph
114	What is Finite Graph	A graph with a finite number of nodes and edges
115	What is Infinite graph	A graph which has either an infinite number of edges or vertices is called an infinite graph.
116	In a complete graph every vertices is connected to	each vertex is connected to every other vertex of that graph
117	In a directed complete graph, if no. of vertices is 3 then no of edges is	
118	In a undirected complete graph, if no. of vertices is 3 then no of edges is	
119	Null graph contains zero edges, State True or False	TRUE
120	What are the types of sub-graph	Edge disjoint subgraph and Vertex disjoint subgraph:

UNIT - 4

1. Adjacency matrix

2.

3. The minimum number of colors required for the edges of a given graph. is called as Chromati Index.

4. A Minimum spanning tree or minimu weight spanning tree is a subset of the edges of a connected (un) directed edge weighted graph that connects all vertices together, without any cycles.

5. We know that

$$2e = \Sigma \deg(v)$$

let no of vertices $= n$

so, $2 \times 21 = 3 \times 4 + 2(n-3)$

$$42 = 12 + 2n - 6$$

$$42 - 6 = 2n$$

$$\boxed{n = 18}$$

6. ATQ

$$2 \times 24 = n \text{ (No of vertices)} \; K$$

$$48 = nK$$

$$n = 48/K \quad \text{— (1)}$$

Again, the maximum no of edges of a simple graph = $\frac{n(n-1)}{2}$ i.e $\frac{n(n-1)}{2} \geq 24$

$$n(n-1) \geq 48$$

The possible value of n which satisfies (i) are 48, 24, 16, 12, 8, 6, 4, 3, 2, 1 for $k = 1, 2, 3, 4, 6, 8, 12, 16, 24, 48$

The value of n satisfies (ii) are 48, 24, 16, 12, 8, Hence required value of n are 48, 24, 16, 12, 8

—x—

7. ~~Solved~~

8. 4 non Isomorphic graphs

9.

10. $r = e - v + (k+1)$
$r = 9 - 10 + (3+1)$
$r = 9 - 6$
$r = 3$

11. In simple planer graph r is >= 3
So. $3 \times |R| <= 2 \times |E|$
$3 \times |R| <= 20$
$|R| <= 6.67$
$|R| = 6$ Ans

15. By Euler formula

$$n - e = 2 - r$$

$$-1 = 2 - r$$

$$\boxed{r = 3}$$

18. Maximum No of edges in bipartite =

$$\frac{1}{4} \times n^2$$

$$\Rightarrow \frac{1}{4} \times (12)^2 = 36$$

Ans. 36.

23. By formula

$$V - E + R = 2$$

$$R = 7$$

Out of 7 faces one is an unbounded face, so total 6 bounded faces.

26. In 4- regular graph, degree = 4

$$2E = N \times 4$$

$$2 \times 10 = N \times 4$$

$$\boxed{N = 5}$$

27. Total edges = 28

for complete graph if n is vertices

$$= \frac{n(n-1)}{2} = 28$$

$$\Rightarrow (n-8)(n+7) = 0$$

Therefore, G_1 has 8 vertices.

28. $E = \frac{nd}{2}$ so

$$E = \frac{3 \times 8}{2}$$

$$\boxed{E = 12}$$

29 According To $2E = n \times d$

$$n = \frac{2 \times 16}{2}$$

$$\boxed{n = 16}$$

49.

A cycle of length 3 can be formed with 3 vertices. There can be total ${}^8C_3$ ways to pick 3 vertices from 8.

So expected no of unordered cycle of length 3 $= {}^8C_3 \times \left(\frac{1}{2}\right)^3$

$$= \frac{8 \times 7 \times 6}{3 \times 2 \times 1} \times \frac{1}{8}$$

$$\Rightarrow 7$$

56. ~~V = f~~.

$$V - e + f = 2 \quad \text{---} (1)$$

V → Vertices e = No of edges

f = No of faces

A.T.Q → V = 10

And no of edges on each face is 3, Therefore, $2e = 3f$

In eq^n (1)

$$10 - e + \frac{2e}{3} = 2$$

$$e = 24$$