Subject Code	**CA 2.2**
Subject	**Discrete Mathematics**
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QUE. NO.	QUESTION	ANS
1.	Let P: I am in Bangalore.; Q: I love cricket.; then q -> p(q implies p) is? (A) If I love cricket then I am in Bangalore (B) If I am in Bangalore then I love cricket (C) I am not in Bangalore (D) I love cricket	A
2.	Let L(x, y) be the statement "x loves y," where the domain for both x and y consists of all people in the world. Use quantifiers to express, "Joy is loved by everyone." (A) ∀x L(x, Joy) (B) ∀y L(Joy,y) (C) ∃y∀x L(x, y) (D) ∃x ¬L(Joy, x)	A
3.	R is a binary relation on a set S and R is reflexive if and only if _____ (A) r(R) = R (B) s(R) = R (C) t(R) = R (D) f(R) = R	A
4.	The set of odd and even positive integers closed under multiplication is _____ (A) A free semigroup of (M, ×) (B) A subsemigroup of (M, ×) (C) A semigroup of (M, ×) (D) A subgroup of (M, ×)	B
5.	For a connected planar simple graph G=(V, E) with e=|E|=16 and v=|V|=9, then find the number of regions that are created when drawing a planar representation of the graph? (A) 321 (B) 9 (C) 1024 (D) 596	B
6.	Which of the following is true? (A) Prim's algorithm can also be used for disconnected graphs (B) Kruskal's algorithm can also run on the disconnected graphs (C) Prim's algorithm is simpler than Kruskal's algorithm (D) In Kruskal's sort edges are added to MST in decreasing order of their weights	B
7.	Every teacher is liked by some student (A) ∀(x) [teacher (x) → ∃ (y) [student (y) → likes (y, x)]] (B) ∀ (x) [teacher (x) → ∃ (y) [student (y) ^ likes (y, x)]] (C) ∃ (y) ∀ (x) [teacher (x) → [student (y) ^ likes (y, x)]] (D) ∀ (x) [teacher (x) ^ ∃ (y) [student (y) → likes (y, x)]]	B
8.	Which of the following ways can be used to represent a graph? (A) Adjacency List and Adjacency Matrix (B) Incidence Matrix (C) Adjacency List, Adjacency Matrix as well as Incidence Matrix (D) No way to represent	C

9.	Match the following A. Groups I. Associativity B. Semi groups II. Identity C. Monoids III. Commutative D. Abelian Groups IV Left inverse Codes A B C D (A) IV I II III (B) III I IV II (C) II III I IV (D) I II III IV	A
10.	What is the identity element In the group G = {2, 4, 6, 8) under multiplication modulo 10? (A) 5 (B) 9 (C) 6 (D) 12	C
11.	If A, B, C be three sets such that A ∪ B = A ∪ C and A ∩ B = A ∩ C, then? (A) A=B (B) A=C (C) B=C (D) A=B=C	C
12.	What is the number of vertices of degree 2 in a path graph having n vertices, here n>2. (A) n-2 (B) n (C) 2 (D) 0	A
13.	(a,b) what is a? (A) Domain (B) Range (C) Domain & Range (D) None of the mentioned	A
14.	A subgroup has the properties of _____ (A) Closure, associative (B) Commutative, associative, closure (C) Inverse, identity, associative (D) Closure, associative, Identity, Inverse	D
15.	What is an inverse of – **i** in the multiplicative group if {1, – 1, **i ,** – i} is? (A) -1 (B) 1 (C) i (D) None of these	C
16.	Which of the following satisfies commutative law? (A) ∧ (B) v (C) ↔ (D) All of the mentioned	D
17.	An important application of binary tree is _____ (A) Huffman coding (B) Stack implementation (C) Queue implementation (D) Traverse a cyclic graph	A
18.	The premises (p ∧ q) ∨ r and r → s implies which of the conclusion? (A) p ∨ r (B) p ∨ s (C) q ∨ s (D) q ∨ r	B

19.	The binary relation {(1,1), (2,1), (2,2), (2,3), (2,4), (3,1), (3,2)} on the set {1, 2, 3} is _____ (A) Reflective, symmetric and transitive (B) Irreflexive, symmetric and transitive (C) Neither reflective, nor irreflexive but transitive (D) Irreflexive and antisymmetric	C
20.	An expression tree is a kind of? (A) Binary search tree (B) Fibonacci tree (C) Binary tree (D) Treap	C
21.	Prim's algorithm is a _____ (A) Divide and conquer algorithm (B) Greedy algorithm (C) Dynamic Programming (D) Approximation algorithm	B
22.	If we choose Prim's Algorithm for uniquely weighted spanning tree instead of Kruskal's Algorithm, then (A) We'll get a different spanning tree. (B) We'll get the same spanning tree. (C) Spanning will have less edges. (D) Spanning will not cover all vertices.	B
23.	The travelling salesman problem can be solved using _____ (A) A spanning tree (B) A minimum spanning tree (C) Bellman – Ford algorithm (D) DFS traversal	B
24.	A rule of inference that introduces existential quantifiers (A) Universal Generalization (B) Existential Generalization (C)Existential Instantiation (D) Existential Quantifier	B
25.	Let P: We should be honest., Q: We should be dedicated., R: We should be overconfident. Then 'We should be honest or dedicated but not overconfident.' is best represented by? (A) ~P V ~Q V R (B) P ∧ ~Q ∧ R (C) P V Q ∧ R (D) P V Q ∧ ~R	D
26.	Let P and Q be statements, then P<->Q is logically equivalent to _____ (A) P<->~Q (B) ~P<->Q (C) ~P<->~Q (D) None of the mentioned	C
27.	Length of the walk of a graph is .... ? (A) The number of vertices in walk W (B) The number of edges in walk W (C) Total number of edges in a graph (D) Total number of vertices in a graph	B
28.	The compound statement A-> (A->B) is false, then the truth values of A, B are respectively _____ (A) T, T (B) F, T (C) T, F (D) F, F	C
29.	A group (M,*) is said to be abelian if _____ (A) (x+y)=(y+x) (B) (x*y)=(y*x) (C) (x+y)=x (D) (y*x)=(x+y)	B

30.	Let P: We give a nice overall squad performance, Q: We will win the match. Then the symbolic form of "We will win the match if and only if we give a nice overall squad performance." is? (A) P v Q (B) Q ∧ P (C) Q<->P (D) ~P v Q	C
31.	The statement (~P<->Q)∧~Q is true when? (A) P: True Q: False (B) P: True Q: True (C) P: False Q: True (D) P: False Q: False	A
32.	33. The problem of finding a path in a graph that visits every vertex exactly once is called? (A) Hamiltonian cycle problem (B) Subset sum problem 34. (C) Turnpike reconstruction problem (D) Hamiltonian path problem	D
33.	Let P, Q, R be true, false, false, respectively, which of the following is true? (A) P∧(Q∧~R) (B) (P->Q)∧~R (C) Q<->(P∧R) (D) P<->(QvR)	C
34.	Which of the following is not a phase of project management? (A) Project planning (B) Project scheduling (C) Project controlling (D) Project being	D
35.	In an n-ary tree, each vertex has at most _____ children. (A) n (B) n^4 (C) n*n (D) n-1	A
36.	Which of the following statements for a simple graph is correct? (A) Every path is a trail (B) Every trail is a path (C) Every trail is a path as well as every path is a trail (D) Path and trail have no relation	A
37.	Which of the following represents: ~A (negation of A) if A stands for "I like badminton but hate maths"? (A) I hate badminton and maths (B) I do not like badminton or maths (C) I dislike badminton but love maths (D) I hate badminton or like maths	D
38.	Which of the following is false in the case of a spanning tree of a graph G? (A) It is tree that spans G (B) It is a sub graph of the G (C) It includes every vertex of the G (D) It can be either cyclic or acyclic	D
39.	Two labeled trees are isomorphic if _____ (A) Graphs of the two trees are isomorphic (B) The two trees have same label (C) Graphs of the two trees are isomorphic and the two trees have the same label (D) Graphs of the two trees are cyclic	C
40.	~ A v ~ B is logically equivalent to? (A) ~ A → ~ B (B) ~ A ∧ ~ B (C) A → ~B (D) B V A	C

41.	$A \rightarrow (A \vee q)$ is a _____ (A) Tautology (B) Contradiction (C) Contingency (D) None of the mentioned	A
42.	A graph with all vertices having equal degree is known as a _____ (A) Multi Graph (B) Regular Graph (C) Simple Graph (D) Complete Graph	B
43.	What are the inverse of the conditional statement "If you make your notes, it will be a convenient in exams." (A) "If you make notes, then it will be a convenient in exams." (B) "If you do not make notes, then it will not be a convenient in exams." (C) "If it will not be a convenient in exams, then you did not make your notes." (D) "If it will be a convenient in exams, then you make your notes	B
44.	If (G, .) is a group such that $a2 = e$, $\forall a \in G$, then G is (A) Semi group (B) Abelian group (C) Non abelian group (D) None of these	B
45.	$(p \rightarrow q) \wedge (p \rightarrow r)$ is logically equivalent to _____ (A) $p \rightarrow (q \wedge r)$ (B) $p \rightarrow (q \vee r)$ (C) $p \wedge (q \vee r)$ (D) $p \vee (q \wedge r)$	A
46.	The statement," Every comedian is funny" where C(x) is "x is a comedian" and F (x) is "x is funny" and the domain consists of all people. (A) $\exists x(C(x) \wedge F(x))$ (B) $\forall x(C(x) \wedge F(x))$ (C) $\exists x(C(x) \rightarrow F(x))$ (D) $\forall x(C(x) \rightarrow F(x))$	D
47.	Which of the following is De-Morgan's law? (A) $P \wedge (Q \vee R) \equiv (P \wedge Q) \vee (P \wedge R)$ (B) $\sim(P \wedge R) \equiv \sim P \vee \sim R$, $\sim(P \vee R) \equiv \sim P \wedge \sim R$ (C) $P \vee \sim P \equiv$ True, $P \wedge \sim P \equiv$ False (D) None of the mentioned	B
48.	Translate $\forall x \exists y(x < y)$ in English, considering domain as a real number for both the variable. (A) For all real number x there exists a real number y such that x is less than y (B) For every real number y there exists a real number x such that x is less than y (C) For some real number x there exists a real number y such that x is less than y (D) For each and every real number x and y such that x is less than y	A
49.	The statement, "At least one of your friends is perfect". Let P (x) be "x is perfect" and let F (x) be "x is your friend" and let the domain be all people. (A) $\forall x (F(x) \rightarrow P(x))$ (B) $\forall x (F(x) \wedge P(x))$ (C) $\exists x (F(x) \wedge P(x))$ (D) $\exists x (F(x) \rightarrow P(x))$	C
50.	……. Is a directed tree in which out degree of each node is less than or equal to two (A) Unary tree (B) Binary tree (C) Trinary tree (D) Both B and C	B

51.	Let T (x, y) mean that student x likes dish y, where the domain for x consists of all students at your school and the domain for y consists of all dishes. Express ¬T (Amit, South Indian) by a simple English sentence. (A) All students does not like South Indian dishes. (B) Amit does not like South Indian people. (C) Amit does not like South Indian dishes. (D) Amit does not like some dishes.	D
52.	If two cycle graphs Gm and Gn are joined together with a vertex, the number of spanning trees in the new graph is _____ (A) m+n-1 (B) m-n (C) m*n (D) m*n+1	C
53.	What rule of inference is used in this argument? "If I go for a balanced diet, then I will be fit. If I will be fit, then I will remain healthy. Therefore, if I go for a balanced diet, then I will remain healthy." (A) Modus tollens (B) Modus ponens (C) Disjunctive syllogism (D) Hypothetical syllogism	D
54.	What is the postfix expression of (A+B)-C*(D/E))+F? (A) A B + C D E / * – F + (B) A B C D E + / * F – + (C) A B C + * D E / F + – (D) A B + C – * D E / F +	A
55.	The rank of smallest equivalence relation on a set with 12 distinct elements is _____ (A) 12 (B) 144 (C) 136 (D) 79	A
56.	Minimum number of unique colors required for vertex coloring of a graph is called? (A) Vertex matching (B) Chromatic index (C) Chromatic number (D) Color number	C
57.	Amongst the properties {reflexivity, symmetry, antisymmetry, transitivity} the relation R={(a,b) ∈ N^2 | a!= b} satisfies _____ property. (A) symmetry (B) transitivity (C) antisymmetry (D) reflexivity	A
58.	Depth First Search is equivalent to which of the traversal in the Binary Trees? (A) Pre-order Traversal (B) Post-order Traversal (C) Level-order Traversal (D) In-order Traversal	A
59.	An algebraic structure _____ is called a semi group. (A) (P, *) (B) (Q, +, *) (C) (P, +) (D) (+, *)	A
60.	State true or false. i) An empty tree is also a binary tree. ii) In strictly binary tree, the out-degree of every node is either o or 2. (A)True,False (B) False,True (C) True,True (D) False,False	C

61.	The binary relation U = Φ (empty set) on a set A = {11, 23, 35} is _____ (A) Neither reflexive nor symmetric (B) Symmetric and reflexive (C) Transitive and reflexive (D) Transitive and symmetric	D
62.	All possible spanning trees of graph G (A) Have same number of edges and vertices. (B) Have same number of edges and but not vertices. (C) Have same number of vertices but not edges. (D) Depends upon algorithm being used.	A
63.	The number of edges from the node to the deepest leaf is called _____ of the tree. (A) Height (B) Depth (C) Length (D) Width	A
64.	Consider the relation: R' (x, y) if and only if x, y>0 over the set of non-zero rational numbers,then R' is _____ (A) not equivalence relation (B) an equivalence relation (C) transitive and asymmetry relation (D) reflexive and antisymmetric relation	B
65.	Consider the binary relation, A = {(a,b) | b = a – 1 and a, b belong to {1, 2, 3}}. The reflexive transitive closure of A is? (A) {(a,b) | a >= b and a, b belong to {1, 2, 3}} (B) {(a,b) | a > b and a, b belong to {1, 2, 3}} (C) {(a,b) | a <= b and a, b belong to {1, 2, 3}} (D) {(a,b) | a = b and a, b belong to {1, 2, 3}}	A
66.	How many unique colors will be required for proper vertex coloring of a bipartite graph having n vertices? (A) 0 (B) 1 (C) 2 (D) n	C
67.	Determine the characteristics of the relation aRb if $a^2 = b^2$. (A) Transitive and symmetric (B) Reflexive and asymmetry (C) Trichotomy, antisymmetry, and irreflexive (D) Symmetric, Reflexive, and transitive	D
68.	A compound proposition that is neither a tautology nor a contradiction is called a _____ (A) Contingency (B) Equivalence (C) Condition (D) Inference	A
69.	Which of the following statement is correct? (A) p ∨ q ≡ q ∨ p (B) ¬(p ∧ q) ≡ ¬p ∨ ¬q (C) (p ∨ q) ∨ r ≡ p ∨ (q ∨ r) (D) All of mentioned	D
70.	The less-than relation, <, on a set of real numbers is _____ (A) not a partial ordering because it is not asymmetric and irreflexive equals antisymmetric (B) a partial ordering since it is asymmetric and reflexive (C) a partial ordering since it is antisymmetric and reflexive (D) not a partial ordering because it is not antisymmetric and reflexive	A

71.	A non empty set A is termed as an algebraic structure _____ (A) with respect to binary operation * (B) with respect to ternary operation ? (C) with respect to binary operation + (D) with respect to unary operation –	A
72.	A graph G is called a .....if it is a connected acyclic graph ? (A)Cyclic graph (B) Regular graph (C)Tree (D) Not a graph	C
73.	The graph representing universal relation is called _____ (A) complete digraph (B) partial digraph (C) empty graph (D) partial subgraph	A
74.	In the …….. traversal we process all of a vertex's descendants before we move to an adjacent vertex. (A) Depth First (B) Breadth First (C) Width First (D) Depth Limited	A
75.	When inorder traversing a tree resulted E A C K F H D B G; the preorder traversal would return (A) FAEKCDBHG (B) FAEKCDHGB (C) EAFKHDCBG (D) FEAKDCHBG	B
76.	If P is always against the testimony of Q, then the compound statement P→(P v ~Q) is a _____ (A) Tautology (B) Contradiction (C) Contingency (D) None of the mentioned	A
77.	Degree of a graph with 12 vertices is _____ (A) 25 (B) 56 (C) 24 (D) 212	C
78.	What will be the chromatic index for a complete graph having n vertices (consider n to be an even number)? (A) n (B) n + 1 (C) n – 1 (D) 2n + 1	C
79.	In a finite graph the number of vertices of odd degree is always _____ (A) even (B) odd (C) even or odd (D) infinite	A
80.	Let P: I am in Delhi.; Q: Delhi is clean.; then q ^ p(q and p) is? (A) Delhi is clean and I am in Delhi (B) Delhi is not clean or I am in Delhi (C) I am in Delhi and Delhi is not clean (D) Delhi is clean but I am in Mumbai	A
81.	A connected planar graph having 6 vertices, 7 edges contains _____regions. (A) 15 (B) 3 (C) 1 (D) 11	B
82.	Which traversal of tree resembles the breadth first search of the graph? (A) Preorder (B) Inorder (C) Postorder (D) Level order	D

83.	If each and every vertex in G has degree at most 23 then G can have a vertex colouring of _____ (A) 24 (B) 23 (C) 176 (D) 54	A
84.	How many properties can be held by a group? (A) 2 (B) 3 (C) 5 (D) 4	C
85.	Matrix multiplication is a/an _____ property. (A) Commutative (B) Associative (C) Additive (D) Disjunctive	B
86.	A _____ is a graph which has the same number of edges as its complement must have number of vertices congruent to 4m or 4m modulo 4(for integral values of number of edges). (A) Subgraph (B) Hamiltonian graph (C) Euler graph (D) Self complementary graph	D
87.	Which of the following pairs of traversals is not sufficient to build a binary tree from the given traversals? (A) Preorder and In order (B) Preorder and Postorder (C) Inorder and Post order (D) None of the Above	B
88.	A graph having an edge from each vertex to every other vertex is called a _____ (A) Tightly Connected (B) Strongly Connected (C) Weakly Connected (D) Loosely Connected	A
89.	In a _____ the vertex set and the edge set are finite sets. (A) finite graph (B) bipartite graph (C) infinite graph (D) connected graph	B
90.	Suppose a relation R = {(3, 3), (5, 5), (5, 3), (5, 5), (6, 6)} on S = {3, 5, 6}. Here R is known as _____ (A) Equivalence relation (B) Reflexive relation (C) Symmetric relation (D) Transitive relation	A
91.	$p \rightarrow q$ is logically equivalent to _____ (A) $\neg p \vee \neg q$ (B) $p \vee \neg q$ (C) $\neg p \vee q$ (D) $\neg p \wedge q$	C
92.	Any subset of edges that connects all the vertices and has minimum total weight, if all the edge weights of an undirected graph are positive is called _____ (A) subgraph (B) tree (C) hamiltonian cycle (D) grid	B
93.	A graph which has the same number of edges as its complement must have number of vertices congruent to _____ or _____ modulo 4(for integral values of number of edges). (A) 6k, 6k-1 (B) 4k, 4k+1 (C) k, k+2 (D) 2k+1, k	C

94.	Which of the following is true? (A) A graph may contain no edges and many vertices (B) A graph may contain many edges and no vertices (C) A graph may contain no edges and no vertices (D) A graph may contain no vertices and many edges	B
95.	A graph G has the degree of each vertex is ≥ 3 say, deg(V) ≥ 3 ∀ V ∈ G such that 3|V| ≤ 2|E| and 3|R| ≤ 2|E|, then the graph is said to be _____ (R denotes region in the graph) (A) Planner graph (B) Polyhedral graph (C) Homomorphic graph (D) Isomorphic graph	B
96.	A complete n-node graph Kn is planar if and only if _____ (A) n ≥ 6 (B) $n^2 = n + 1$ (C) n ≤ 4 (D) n + 3	C
97.	An isomorphism of graphs G and H is a bijection f the vertex sets of G and H. Such that any two vertices u and v of G are adjacent in G if and only if _____ (A) f(u) and f(v) are contained in G but not contained in H (B) f(u) and f(v) are adjacent in H (C) f(u * v) = f(u) + f(v) (D) $f(u) = f(u)^2 + f(v)^2$	B
98.	A _____ in a graph G is a circuit which consists of every vertex (except first/last vertex) of G exactly once. (A) Euler path (B) Hamiltonian path (C) Planar graph (D) Path complement graph	B
99.	A trail in a graph can be described as _____ (A) a walk without repeated edges (B) a cycle with repeated edges (C) a walk with repeated edges (D) a line graph with one or more vertices	A
100	The full form of CPM is _____ (A) Critical Path Method (B) Control Path Method (C) Critical Plan Management (D) Control Path Management	A