Question Booklet Number

OMR Answer Sheet No.

23/3196

B.C.A. (II Semester) Examination, 2023

Fundamentals of Discrete Mathematics

Booklet Code **A**

Paper : V (A) (Optional)

Major

(निम्न पूर्तियाँ परीक्षार्थी स्वयं भरें / To be filled in by the Candidate)

अनुक्रमांक (अंकों में)
Roll No. (in figures)

अनुक्रमांक (शब्दों में)
Roll No. (in words)

Enrolment No. (in figures)

कॉलेज का नाम
Name of College

| समय : 2 : 00 घण्टे
| Time : 2 : 00 Hours

| अधिकतम अंक : 75
| Maximum Marks : 75

कक्ष निरीक्षक के हस्ताक्षर
Signature of Invigilator

परीक्षार्थियों के लिए निर्देश :

1 प्रश्न-पुस्तिका को तब तक न खोले जब तक आपसे कहा न जाए।

2 इस प्रश्न पुस्तिका मे कुल 75 प्रश्न हैं। परीक्षार्थियो को सभी प्रश्न हल करना अनिवार्य है। दिये गये OMR उत्तर-पत्रक पर ही सभी प्रश्न हल करना है। सभी प्रश्नों के अंक समान हैं।

3 प्रश्नो के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR उत्तर-पत्रक को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमे कुछ भाग छपने से छूट गये हो या प्रश्न एक से अधिक बार छप गये हो या किसी भी प्रकार के कमी हो उसे तुरन्त बदल लें।

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.

2. This booklet contains 75 questions. Examinee have to attempt all questions. All questions attempt on the given OMR Answer Sheet. All questions carry equal marks.

3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be immediately replaced.

(शेष निर्देश अन्तिम पृष्ठ पर)

(Remaining Instructions on last page)

1. By using _____, Boolean expressions can be graphically represented.

(1) Analytic circuit

(2) Analytic gate

(3) Logic circuits

(4) Logic gates

2. _____ gates receive inputs x and y and product outputs $x \wedge y$

(1) AND

(2) OR

(3) NOR

(4) XOR

3. x and y are inputs to an _____ gate, which produces $x \vee y$ as outputs

(1) AND

(2) OR

(3) XOR

(4) NOR

4. Which of the following are the Canonical forms?

(1) Disjunctive Normal Forms

(2) Conjunctive Normal Forms

(3) Both (1) and (2)

(4) None of the above

5. Disjunctive Normal Forms are also known as

(1) Sum of products

(2) Product of sums

(3) Neither (1) and (2)

(4) None of the above

6. Conjunctive Normal Forms are also known as

(1) Product of sums

(2) Sum of products

(3) Neither (1) and (2)

(4) None of the above

7. When the identity elements 0 and 1, in the original expression E, are switched, then the _____ of that expression is obtained

(1) Dual

(2) Duplex

(3) Triplet

(4) Identity

8. What is idempotent law?

(1) $A \cup A = A$

(2) $A \cap A = A$

(3) Both (1) and (2)

(4) None of the above

9. What is associative law?

(1) $(A \cup C)=A \cup (B \cup C)$

(2) $(A \cup B)=A \cup (B \cup C)$

(3) $(A \cup C) \cup C=A \cup (B \cup C)$

(4) $(A \cup B) \cup C=A \cup (B \cup C)$

10. What is commutative law?

(1) $A \cup B=B \cup A$

(2) $A \cap B=B \cap A$

(3) Both the (1) and (2)

(4) None of the above

11. What is distributive law?

(1) $A \cup (B \cup C)=(A \cup B) \cap (A \cup C)$

(2) $A \cap (B \cap C)=(A \cup B) \cap (A \cup C)$

(3) $A \cup (B \cap C)=(A \cup B) \cap (A \cup C)$

(4) $A \cap (B \cap C)=(A \cup B) \cap (A \cup C)$

12. What is Demorgan law?

(1) $(A \cup B)^c=A^c \cup B^c$

(2) $(A \cup B)^c=A^c \cap B^c$

(3) $(A \cap B)^c=A^c \cap B^c$

(4) $(A \cap B)=A^c \cap B^c$

13. What is identity law?

(1) $A \cup \phi=A$

(2) $A \cup U=U$

(3) $A \cap \phi=\phi$

(4) All of the above

14. What is complement law?

(1) $A \cup A^c=U$

(2) $A \cap A^c=U$

(3) $A \cup A=U$

(4) $A \cap A=U$

15. What is involution law?

(1) $(A^c)=A$

(2) $(A)^c=A$

(3) $(A^c)^c=A$

(4) $((A^c)^c)^c=A$

16. Cartesian products are sets of all ordered pair whose first members belong to one set and the second members to the other, denoted by the symbols _____

(1) $A \times B$

(2) $A+B$

(3) $A-B$

(4) A/B

17. Which of the following are the complement laws?

(1) $A \cap A^c = \phi$

(2) $U^c = \phi$

(3) $\phi^c = U$

(4) All of the above

18. In which of the following ways can relation be represented?

(1) Relation as a matrix

(2) Relation as a directed graph

(3) Relation as an arrow diagram

(4) All of the above

19. Which of the following are the types of relation?

(1) Reflexive relation

(2) Irreflexive relation

(3) Symmetric relation

(4) All of the above

20. _____ for every $a \in A$ is said to be a reflexive relation R on set A

(1) $(a,a) \in A$

(2) $(a) \in R$

(3) $(a,a) \notin R$

(4) $(a,a) \in R$

21. Symmetric relations in set A are defined as _____

(1) $(a,b) \in R \Leftrightarrow (a) \in R$

(2) $(a,b) \in R \Rightarrow (b) \in R$

(3) $(a,b) \in R \Rightarrow (b,a) \in R$

(4) $(a,b) \in R \Leftrightarrow (a,b) \in R$

22. When $(a,b) \in R$ and $(b,a) \in R$, then _____ a relation R is antisymmetric

(1) $a=b$

(2) $a \neq b$

(3) $a*b$

(4) $a-b$

23. When $(a,b) \in R$ and $(b,c) \in R \Leftrightarrow (a,c) \in R$ on set A, it is said that R is _____

(1) Transitive

(2) Identity

(3) Void

(4) Universal

24. If set A is _____, then it is an identity relation.

(1) Reflexive

(2) Transitive

(3) Symmetric

(4) All of the above

25. $A \rightarrow B$'s Universal Relationship is _____.

(1) Symmetrical

(2) Reflexive

(3) Transitive

(4) All of the above

26. If a relation is symmetrical, reflexive and transitive, then it is a _____.

(1) Equal relation

(2) Equivalence relation

(3) Symmetrical relation

(4) Asymmetrical relation

27. How many properties are there in partial order relations?

(1) 2

(2) 3

(3) 4

(4) 5

28. Which of the following is a property in partial order relations?

(1) Reflexive

(2) Antisymmetric

(3) Transitive

(4) All of the above

29. A partial order set or _____ is the set A coupled with a partial order relation R on the set A?

(1) OFFSET

(2) OPSET

(3) POSET

(4) PFFSET

30. A relationship of equivalence must be _____, but a relationship of compatibility does not have to be an equivalence?

(1) Compatible

(2) Composite

(3) Cartesian

(4) Circular

31. The act of traversing a tree involves visiting all its _____?

(1) Nodes

(2) Edges

(3) Both (1) and (2)

(4) End points

32. What are the standard methods to traverse the binary tree?

(1) Preorder Traversal

(2) Postorder Traversal

(3) Inorder Traversal

(4) All of the above

33. What does ϕ means in a set?

(1) Empty set

(2) Universal set

(3) Both (1) and (2)

(4) None of the above

34. What does U mean in a set?

(1) Unique set

(2) Universal set

(3) Uniset

(4) None of the above

35. It is called the _____ of the set when there are a total number of unique elements?

(1) Uniquely

(2) Cardinality

(3) Separately

(4) Specifically

36. If every element of A is also an element of B, it is denoted by

(1) $A \subseteq B$

(2) $A \supset B$

(3) A–B

(4) A+B

37. Whenever A is a sub set of B, and $A \neq B$, then A is called a _____ subset of B

(1) proper

(2) Improper

(3) Finite

(4) Infinite

38. B _____ of A if A is a proper subset of B.

(1) Is not a subset

(2) Is a subset

(3) Is not a superset

(4) None

39. Every set has a null _____ as a proper subset

(1) ϕ

(2) =

(3) *

(4) $\cup$

40. When set is represented in pictorial format, it is known as

(1) Pictorial diagram

(2) Vven diagram

(3) Veen diagram

(4) Venn diagram

41. Tree's are _____?

(1) Acyclic graphs

(2) Graphs without cycles

(3) Both (1) and (2)

(4) None of the above

42. What are the properties of trees?

(1) Every pair of vertices in a tree has a single path between them

(2) Tree are graphs whose vertices are connected to each other only be one path

(3) There are n-L edges in tree T with n vertices

(4) All of the above

43. Trees that have one root node or vertex with incoming degrees of 0, and all other vertices with incoming degrees of 1, are called _____ trees?

(1) Internal

(2) Rooted

(3) Non-rooted

(4) External

44. In a directed tree, a _____ tree is one in which every nodes has an outdegree less than or equal to two?

(1) Non-binary

(2) Less-binary

(3) Partial binary

(4) Binary.

45. Nodes that have _____ are called their parents?

(1) Left children

(2) Right children

(3) Both left and right children

(4) All of the above

46. It is called a sibling node when two nodes have the _____ parent.

(1) Same

(2) Different

(3) Neighbour

(4) None

47. A nodes _____ is determined by its distance from the root?

(1) Depth

(2) Level

(3) Quantity

(4) Quality

48. Root has a _____ level?

(1) Zero

(2) One

(3) Two

(4) Three

49. Any level N can have a maximum of nodes?

(1) N^2

(2) 2^N

(3) 2^{N-2}

(4) 2^{N-1}

50. Binary trees with the maximum number of possible nodes at every level, except perhaps the last, are considered _____?

(1) Binary trees

(2) Incomplete binary trees

(3) Complete binary trees

(4) Partially complete binary trees

51. Binary trees with full leaves and two children for non-leaf nodes are called _____ binary trees?

(1) Half

(2) Full

(3) Non-empty

(4) Null

52. Group G consist of _____

(1) An element of G is a vertex, point or node of a set V=V(G).

(2) Edges of G represent pairs of distinct vertices ordered by set E=E(G)

(3) Such a graph is denoted by G(V, E) if an edge e=[u,v] connects two adjacent vertices u and v

(4) All of the above

53. Vertex degrees are calculated based on the number of _____ that are incident on the vertex?

(1) Points

(2) Edges

(3) Vertex

(4) Nodes

54. When there is no repetition of edges in the path, it is called a _____ path.

(1) Simple

(2) Circuit

(3) Closed

(4) Elementary

55. If an edge connects two vertices they are considered _____?

(1) Cross

(2) Adjacent

(3) Normal

(4) Incident

56. Isolated vertex refers to a vertex with degree _____?

(1) 0

(2) 1

(3) 2

(4) Null

57. _____ graphs contain unordered pair of vertices in the edge set?

(1) Directed

(2) Undirected

(3) Multi

(4) Null

58. In a graph, _____ refers to edges that can connect the same vertices over more than one edge?

(1) Multigraph

(2) Directed graph

(3) Connected graph

(4) Disconnected graph

59. Directed graph is also known as _____?

(1) Connected graph

(2) Digraph

(3) Disconnected graph

(4) Monograph

60. How many edges are there in a complete graph with n vertices?

(1) n(n-1)/2

(2) n/2

(3) n(n+1)/2

(4) n(n-1)

61. _____ graphs contain a path between any vertex u and v?

(1) Disconnected

(2) Connected

(3) Incomplete

(4) Complete

62. When each edge of graph G=(V,E) contains a positive number w, it is called a _____ graph?

(1) Directed

(2) Complementary

(3) Labeled

(4) Weighted

63. When two graphs such as G(V,E) and G* (V*,E*) have a one to one correspondence, they are said to be _____

(1) Isomorphic

(2) Homeomorphic

(3) Both (1) and (2)

(4) None of the above

64. If G1 contains all the vertices of G, it is called a _____ subgraph of G.

(1) Isomorphic

(2) Homeomorphic

(3) Spanning

(4) None of the above

65. Every vertex in G must be connected to every vertex in G for a graph G to be considered?

(1) Complete

(2) Regular

(3) Bipartite

(4) Isomorphic

66. If all it's vertices have the same degree k, the graph is called?

(1) Regular

(2) K-regular

(3) Both (1) and (2).

(4) None of the above

67. _____ paths contain every edge of a graph exactly once in their edge lists?

(1) Euler

(2) Bipartite

(3) Regular

(4) Isomorphic

68. Euler graphs are graphs that contain Euler _____?

(1) Points

(2) Dot's

(3) Circuits

(4) None

69. A _____ graph is one whose edges do not cross in a plane?

(1) Planar

(2) Non-planar

(3) Isomorphic

(4) None of the above

70. There is a region in a plane that cannot be subdivided further because it is bounded by _____?

(1) Vertices

(2) Edges

(3) End points

(4) None

71. There will be _____ region in the planar graph?

(1) An infinite

(2) No Infinite

(3) No plane

(4) Plane

72. Connected planar graph G, whose edges are e, whose vertices are v, and whose regions are r, then v−e+r is equal to?

(1) 1

(2) 2

(3) 3

(4) 0

73. When no edge crosses over another a graph is _____?

(1) Planer

(2) Non-planar

(3) Non-circular

(4) None

74. In order for a graph to be non-planar, it must contain a sub-graph that is _____ to K_5 or $K_{3,3}$?

(1) Isomorphic

(2) Homeomorphic

(3) Isolated

(4) Bipartite

75. A graph G's chromatic number is the number of color's it needs to be properly coloured?

(1) Minimum

(2) Maximum

(3) Average

(4) Medium