

**Department of Information Technology**  
**Class: F. Y. B. Sc. (IT)**  
**Semester-I**  
**Subject: Discrete Mathematics**  
**Sample Questions**

**Multiple Choice Questions**

1. A graph without loops or parallel edges is called.....

- a. Planar.
- b. Simple
- c. Trivial
- d. Bipartite

2. A graph is a collection of vertices and.....

- a. Vertices
- b. Edges
- c. Loops.
- d. Tree

3. If origin & terminal of a walk are same the walk is known as.....

- a. Open.
- b. Closed
- c. Path.
- d. Walk

4. An undirected graph has even number of vertices with .....degree.

- a. Odd
- b. Even
- c. Positive.
- d. Negative

5. A graph with one vertex and no edges is.....

- a. multigraph

b. digraph

C. isolated graph

d. trivial graph

6. 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

7. A graph with all vertices having equal degree is known as a \_\_\_\_\_

a. Multi Graph

b. Regular Graph

c. Simple Graph

d. Complete Graph

8. An edge that starts and ends vertex are same is called.....

a. loop.

b. Tree

C. Parallel.

d. Digraph

9. An ..... cycle in a graph  $G$  is a simple cycle that passes through every edge of  $G$  only once.

a. simple

b. Regular

c. Euler.

d. Path

10. A graph is.....if every pair of vertices can be connected by a path.

a. Connected.

- b. Regular
- c. Complete.
- d. Bipartite

11. Each connected subgraph of a non Connected graph G is called

a.....of G.

- a. Subgraph.
- b. Component
- c. Parallel.
- d. loop

12. if T is a tree of order n, then T has .....edges.

- a. n
- b. n-1
- c. 2n
- d. n-2

13. If F is a cut set of the connected graph G, then G-F has ..... components.

- a. one.
- b. Two
- c. Three.
- d. Four

14. Relations may exist between?

- a. objects of the same set
- b. between objects of two or more sets.
- c. Both A and B
- d. Objects of the different set

15. A binary relation R on a single set A is a subset of?

a.  $A \times A$

b.  $A \% A$

c.  $A \wedge A$

d.  $A \ ? \ A$

16. A relation can be represented using a?

a. Indirected graph

b. Pie graph

c. Directed graph

d.. Line graph

17. The \_\_\_\_\_ Relation between sets X and Y is the set  $X \times Y$

a.. Empty

b. Full

c.. Identity

d. Inverse

18. A relation R on set A is called \_\_\_\_\_ if  $xRy$  implies  $yRx$ .

a. Irreflexive

b. Reflexive

c. Anti-Symmetric

d. Symmetric

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.. reflexive, symmetric and transitive

b. irreflexive, symmetric and transitive

c. neither reflexive, nor irreflexive but transitive

d. irreflexive and antisymmetric

20. A function can not be?

- a. one to one
- b.. many to one
- C. one to many.
- d.. Onto

21.  $f: \mathbb{N} \rightarrow \mathbb{N}, f(x) = 5x$  is?

- a. injective
- b.. not injective
- C.. surjective
- d.. inverse

22. A function  $f: A \rightarrow B$  is \_\_\_\_\_ (onto) if the image of  $f$  equals its range.

- a.. injective
- b.. surjective
- C.. inverse
- d. not surjective

23. If function is both surjective and injective then it is known as?

- a.. invertible
- b. composition
- C.. bijective
- d.. associative

24. If  $f$  and  $g$  are onto then the function  $(g \circ f)$  is?

- a. one to one
- b. onto
- C. one to many.
- d. into

25. Let  $f$  and  $g$  be the function from the set of integers to itself, defined by  $f(x) = 2x + 1$  and

$g(x) = 3x + 4$ . Then the composition of  $f$  and  $g$  is \_\_\_\_\_

a..  $6x+9$

b.  $6x+7$

C..  $6x+3$

d.  $6x+8$

26. which of the following is true?

a. The function  $f(x) = x^3$  is bijection from  $\mathbb{R}$  to  $\mathbb{R}$ .

b.. The function  $f(x)=x+1$  from the set of integers to itself is onto.

C.. Both A and B

d. Both not true.

27. When we perform an experiment, then the set  $S$  of all possible outcomes is called the?

a.. Random Experiment

b.. Event

c.. Sample Space

d. Tossing Space

28. If a coin is tossed, how many possible outcomes?

a. 1

b. 2

C.. 3

d.. 4

29. When a dice is thrown, What is the probability of any one of the numbers?

a.  $(1/3)$

b..  $(5/6)$

C..  $(2/3)$

d..  $(1/6)$

30. From a deck of 52 cards, if one card is picked find the probability of an ace being drawn?

a.  $(1/26)$

b.  $(1/13)$

c.  $(3/52)$

d.  $(1/52)$

31. From a deck of 52 cards, if one card is picked find the probability of a diamond being drawn?

a.  $(1/4)$

b.  $(3/26)$

c.  $(1/6)$

d.  $(1/13)$

32. Discrete probability distribution depends on the properties of \_\_\_\_\_

a. discrete variables

b. probability function

c. machine

d. data

33. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, then the number of blue balls in a bag is:

a. 5

b. 10

c. 15

d. 20

34. Cards marked with numbers 2 to 101 are placed in a box and mixed thoroughly. One card is drawn from this box randomly, then the probability that the number on card is a perfect square.

a.  $(1/5)$

b.  $(1/25)$

c.  $(1/20)$

d.. (1/10)

35.Set theory forms the basis of several other fields of study like?

a.counting theory

b. relations

C. finite state machines

d. collection

36.A set is an \_\_\_\_\_ collection of different elements.

a. unordered

b.ordered

C.. unordered and ordered

d.. Basis

37.A set can be written explicitly by listing its elements using?

a. ()

b.[]

C. {}

d. " "

38.In how many ways, sets can be represented?

a.2

b. 3

C. 4

d. 5

39.A set which contains a definite number of elements is called?

a.Proper Subset

b. Universal Set

C. Finite Set

d. Unit Set

40. Which of the following give the count of the number of ways to partition a set?

a. Power Numbers

b. Cross Numbers

c. Complement Numbers

d. Bell Numbers

41. Which of the following is union of  $\{1, 2, 5\}$  and  $\{1, 2, 6\}$ ?

a.  $\{1, 2, 5, 6\}$

b.  $\{1, 2, 6, 1\}$

c.  $\{1, 2, 1, 2\}$

d.  $\{1, 5, 6, 3\}$

42. Which of the following is complement of the set A?

a.  $A - U$

b.  $A - B$

c.  $U - A$

d.  $B - A$

43. Which of the following statement is false?

a.  $A \cap A = A$

b.  $(A \cup B)' = A' \cup B'$

c.  $A \cup A = A$

d.  $A - (B \cap C) = (A - B) \cup (A - C)$

44. If a set contains 3 elements then the number of subsets are?

a. 3

b. 6

c. 8

d. 12

45. Which of the following is a collection of graph?

- a. Row and column
- b. Vertices and columns
- c. Equation
- d. vertices and edges.

46. Let A and B be two arbitrary events, then

- a.  $P(A \cup B) = P(A) + P(B)$ .
- b.  $P(A \cap B) = P(A) \cdot P(B)$ .
- c.  $P(A \cup B) \leq P(A) + P(B)$ .
- d.  $P(A/B) = P(A \cap B) + P(B)$ .

47. A relation R in a set X is symmetric if \_\_\_\_\_

- a.  $xRy, yRz \Rightarrow xRz$ .
- b.  $xRy$
- c.  $xRy \Rightarrow yRx$
- d.  $xRx$

48. If R is reflexive, symmetric and transitive then the relation is said to be \_\_\_\_\_.

- a. Binary relation
- b. Compatibility relation
- c. Equivalence relation
- d. Partial order relation

49. A graph in which every vertex has same degree is called \_\_\_\_\_ graph.

- a. regular
- b. simple
- c. complete

d. null

50. The number of vertices of odd degree in a graph is always \_\_\_\_\_.

a. odd

b. even

c. zero

d. one

51. of the following sets are null sets ?

a. { }

b.  $\emptyset$

C. Both (a. and (b.

d. {0}

52. The binary relation  $S = \Phi$  (empty set) on set  $A = \{1, 2, 3\}$  is

a. transitive and reflexive

b. symmetric and reflexive

C. transitive and symmetric

d. neither reflexive nor symmetric

53. If A and B are sets and  $A \cup B = A \cap B$ , then

a.  $A = B$

b.  $A = \Phi$

C.  $B = \Phi$

d.  $B = 0$

54. Let A and B be two non-empty relations on a set S. Which of the following statements is false?

a. A and B are transitive  $\Rightarrow A \cap B$  is transitive

b. A and B are symmetric  $\Rightarrow A \cup B$  is symmetric

c. A and B are transitive  $\Rightarrow A \cup B$  is not transitive

d. A and B are reflexive  $\Rightarrow A \cap B$  is reflexive

55. 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

56. If  $R = ((1, 1), (3, 1), (2, 3), (4, 2))$ , then which of the following represents  $R^2$ , where  $R^2$  is  $R$  composite  $R$ ?

a.  $((1, 1), (2, 1), (4, 3), (3, 1))$

b.  $((1, 1), (3, 1), (2, 3), (4, 2))$

c.  $((1, 3), (3, 3), (3, 4), (3, 2))$

d.  $((1, 1), (9, 1), (4, 9), (16, 4))$

57. The number of edges in a complete graph with 'n' vertices is equal to:

a.  $2n-1$

b.  $n(n-1)$

c.  $n^2$

d.  $n(n-1)/2$

58. ordered collection of objects is:

a. Relation

b. set

c. proposition

d. Function

59. A function is a Domain of:

a. it is set of natural numbers for which a function is defined

b. the maximal set of numbers for which a function is defined

c. the maximal set of numbers which a function can take values

d. a and b

60. Range of a function is :

- a. the maximal set of numbers for which a function is defined
- b. the maximal set of numbers which a function can take values
- c. it is set of natural numbers for which a function is defined
- d. it is set of domain and codomain

61. The sum of the first  $n$  natural numbers is given by \_\_\_\_\_

- a.  $n(n+1)/2$
- b.  $n(n-1)/2$
- c.  $n^2(n+1)/2$
- d.  $2n+1$

62. The sequence  $1, 1, 1, 1, 1, \dots$  is?

- a. Absolutely summable
- b. Is not absolutely summable
- c. Can't say
- d. absolutely

63. In the principle of mathematical induction, which of the following steps is mandatory?

- a. induction hypothesis
- b. inductive reference
- c. induction set assumption
- d. minimal set representation

64. For  $m = 1, 2, \dots$ ,  $4m+2$  is a multiple of \_\_\_\_\_

- a. 3
- b. 5
- c. 6

d. 2

65. For every natural number  $k$ , which of the following is true?

a.  $(mn)^k = mknk$

b.  $m^k = n + 1$

c.  $(m+n)^k = k + 1$

d.  $mkn = mnk$

66. By induction hypothesis, the series  $1^2 + 2^2 + 3^2 + \dots + p^2$  can be proved equivalent to \_\_\_\_\_

a.  $p^2 + 27$

b.  $p^2(p+1)^2(2p+1)6$

c.  $p^2(p+1)4$

d.  $p + p^2$

67. Strong induction is a form of mathematical induction that proves that a function  $P(n)$  is true for all.....integers.

a. negative

b. positive

c. real numbers

d. fractional numbers

68. How many five-digit numbers can be made from the digits 1 to 7 if repetition is allowed?

a. 16807

b. 54629

c. 23467

d. 32354

69.  $R$  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.  $f(R) = R$

70. The condition for a binary relation to be symmetric is \_\_\_\_\_

a.  $s(R) = R$

b.  $R \cup R = R$

c.  $R = R^c$

d.  $R = cR$

71. Let  $R_1$  and  $R_2$  be two equivalence relations on a set. Is  $R_1 \cup R_2$  an equivalence relation?

a. an equivalence relation

b. reflexive closure of relation

c. not an equivalence relation

d. partial equivalence relation

72. Let the sequence be 1, 3, 5, 7, 9, ..... then this sequence is \_\_\_\_\_

a. An arithmetic sequence

b. A geometric progression

c. A harmonic sequence

d. A alternating sequence

73. Let the sum of the 3 consecutive terms in AP be 180 then middle of those 3 terms would be \_\_\_\_\_

a. 60

b. 80

c. 90

d. 179

74. How many even 4 digit whole numbers are there?

a. 1358

b. 7250

c. 4500

d. 3600

75. Neela has twelve different skirts, ten different tops, eight different pairs of shoes, three different necklaces and five different bracelets. In how many ways can Neela dress up?

a. 50057

b. 14400

c. 34870

d. 56732

76. The inverse of 3 modulo 7 is?

a. -1

b. -2

c. -3

d. -4

77. The solution of the linear congruence  $4x \equiv 5 \pmod{9}$  is?

a.  $6 \pmod{9}$

b.  $8 \pmod{9}$

c.  $9 \pmod{9}$

d.  $10 \pmod{9}$

78. The linear combination of  $\gcd(10, 11) = 1$  can be written as \_\_\_\_\_

a.  $(-1) \cdot 10 + 1 \cdot 11$

b.  $(-2) \cdot 10 + 2 \cdot 11$

c.  $1 \cdot 10 + (-1) \cdot 11$

d.  $(-1) \cdot 10 + 2 \cdot 11$

79. The value of  $52003 \pmod{7}$  is?

a. 3

b. 4

c. 8

d. 9

80. The prime factorization of 7007 is \_\_\_\_\_

a. 73.11.13

b. 72.11.13

c. 7.11.13

d. 7.113.13

81. Out of the following which of these integers is not prime?

a. 21

b. 35

c. 71

d. 101

82. Which positive integer less than 21 are relatively prime to 21?

a. 18

b. 19

c. 21

d. 24

83. The contrapositive of  $p \rightarrow q$  is the proposition of \_\_\_\_\_

a.  $\neg p \rightarrow \neg q$

b.  $\neg q \rightarrow \neg p$

c.  $q \rightarrow p$

d.  $\neg q \rightarrow p$

84. The inverse of  $p \rightarrow q$  is the proposition of \_\_\_\_\_

a.  $\neg p \rightarrow \neg q$

b.  $\neg q \rightarrow \neg p$

c.  $q \rightarrow p$

d.  $\neg q \rightarrow p$

85. What are the contrapositive of the conditional statement "Medha will find a decent job when she labour hard."?

a. "If Medha labour hard, then she will find a decent job."

b. "If Medha will not find a decent job, then she not labour hard."

c. "If Medha will find a decent job, then she labour hard."

d. "If Medha not labour hard, then she will not find a decent job."

86. The compound propositions p and q are called logically equivalent if \_\_\_\_\_ is a tautology.

a.  $p \leftrightarrow q$

b.  $p \rightarrow q$

c.  $\neg (p \vee q)$

d.  $\neg p \vee \neg q$

87.  $p \rightarrow q$  is logically equivalent to \_\_\_\_\_

a.  $\neg p \vee \neg q$

b.  $p \vee \neg q$

c.  $\neg p \vee q$

d.  $\neg p \wedge q$

88.  $p \vee q$  is logically equivalent to \_\_\_\_\_

a.  $\neg q \rightarrow \neg p$

b.  $q \rightarrow p$

c.  $\neg p \rightarrow \neg q$

d.  $\neg p \rightarrow q$

89.  $(p \rightarrow r) \vee (q \rightarrow r)$  is logically equivalent to \_\_\_\_\_

- a.  $(p \wedge q) \vee r$
- b.  $(p \vee q) \rightarrow r$
- c.  $(p \wedge q) \rightarrow r$
- d.  $(p \rightarrow q) \rightarrow r$

90. 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

91. A connected planar graph having 6 vertices, 7 edges contains \_\_\_\_\_ regions.

- a. 15
- b. 3
- c. 1
- d. 11

92. Which of the following properties does a simple graph not hold?

- a. Must be connected
- b. Must be unweighted
- c. Must have no loops or multiple edges
- d. Must have no multiple edges

93. For a given graph  $G$  having  $v$  vertices and  $e$  edges which is connected and has no cycles, which of the following statements is true?

- a.  $v=e$
- b.  $v = e+1$
- c.  $v + 1 = e$
- d.  $v = e-1$

94. A graph with all vertices having equal degree is known as a \_\_\_\_\_

- a. Multi Graph
- b. Regular Graph
- c. Simple Graph
- d. Complete Graph

95. 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

96. A graph with no edges is known as..... graph .

- a. Empty.
- b. Regular
- c. Complete.
- d. Bipartite.

97. A path of length  $n$  is a sequence of  $n+1$  vertices & .....consecutive edges.

- a.  $2n$ .
- b.  $n$
- c.  $n-1$
- d.  $3n$

98. A graph  $G$  is called tree if it is a connected .....

- a. Acyclic graph.
- b. Cyclic graph
- c. Simple graph.
- d. Trivial graph

99. An edge that starts & ends at the same .....

a.Edge.

b. Vertex

c.loop.

d.cyclic

100.G is..... graph if each edge has been associated with an ordered pair of vertices.

aDirected

b.Planar

c. Simple

d.Complete