GOVERNMENT ZIRTIRI RESIDENTIAL SCIENCE COLLEGE

Subject: MATHEMATICS
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A. Multiple choice questions [75 (15 from each unit)]

1. Two finite sets A and B are said to be equivalent, if
   a) A = B
   b) A≠ B
   c) n (A) = n(B)
   d) n (A) ≠ n(B)

2. If A= { 2, 4, 6, 8, 10, 12 } and B= { 3, 4, 5, 6, 7, 8, 10} then A – B is equal to
   a) { 2 , 12 }
   b) { 3 , 7 }
   c) {2, 12, 3, 7}
   d) $\{\phi\}$

3. If A and B are two sets such that n (A)= 24, n(B)=22 and n(A∩B)=8, then n(A∪ B)is equal to
   a) 46
   b) 54
   c) 42
   d) 38

4. Two sets A and B are said to be disjoint, if
   a) A∩B = A
   b) A∪B = ∪
   c) A∩B = ϕ
   d) A∩B = {0}

5. If A= { x: x $\epsilon N, x \leq 7$}, B= { x: x is a prime, x< 8} and C = { x: x ϵ N, x is odd and x < 10}, then A∪ $(B \cap C)$ is
   a) { 3, 5, 7 }
   b) { 1, 2, 3, 4, 5, 6, 7 }
   c) { 1, 2, 3, 4, 5 }
   d) { 2, 4, 6, 8 }

6. In a Boolean algebra B, for all x, y ϵ B , then x+ $(x.y)$ is equal to
   a) x + y
   b) x . y
   c) x
   d) y

7. The total number of subsets of a set containing n elements is
   a) n
   b) 2n
   c) 2^n
   d) 2
8. If A and B are two sets such that $A \subseteq B$, then A∪B is
   a) A
   b) B
   c) ϕ
   d) ∪

9. A self complemented distributive lattice is called
   a) Boolean Algebra
   b) Modular lattice
   c) Complete lattice
   d) Self dual lattice

10. If S = { a, b, p, q} and Q = { a, p, t}, then S∩Q is
    a) { a, b, p, q, t}
    b) {a}
    c) {a, p, t}
    d) {a, p}

11. A Boolean expression in n variables x_1, x_2, …….x_n is called symmetric if
    a) interchanging any three variables results in an equivalent expression
    b) all variables are equivalent
    c) interchanging any two variables results in an equivalent expression
    d) interchanging of any number of variables results in an equivalent expression

12. If A = { 5, 7, 9, 11,13, 15} and b { x : x = 2n+1, $2 \leq n \leq 7$, n ϵ N }, then B – A is equal to
    a) { 9, 11, 13, 15 }
    b) ϕ
    c) { 5, 7, 9}
    d) B

13. Both the join and meet operations are
    a) commutative
    b) associative
    c) distributive
    d) all of the above

14. In a Boolean algebra B, the elements 0 and 1 are
    a) unique
    b) commutative
    c) associative
    d) all of the above

15. If P and Q are two sets such that n(P∪Q) = 75, n (P∩Q) = 17, n (P) = 49, then n(Q) = ?
    a) 47
    b) 53
    c) 43
    d) 67

16. In the conditional statement P →Q, the statement P is called
    a) antecedent
    b)consequent
    c) conditioner
    d) active

17. A statement formula which is true regardless of the truth values of the statement is
    a) connective
    b) equivalence
    c) tautology
    d) normal form

18. Which of the following propositions is a tautology?
    a) (p∨ q) $\rightarrow p$
    b) $p \vee (q \rightarrow p)$
    c) $p \vee (p \rightarrow q)$
    d) $p \rightarrow (q \rightarrow p)$

19. P∨ דP $\Leftrightarrow$?
    a) T
    b) F
    c) P
    d) דP

20. If p : London is a city, then דp is
    a) London is a well known city
    b) London is a developed city
    c) London has good potential
    d) London is not a city

21. The symbolic form for the statement “The rope will be destroyed if there is a flood” is
    a) $P \wedge Q$
    b) $P \vee Q$
    c) $P \rightarrow Q$
    d) $P \leftrightarrow Q$

22. Which of the following is not a statement?
    a) the earth is round
    b) close the door
    c) $7 + 4 < 9$

d) India is a country

23. If $A \rightarrow B$ is a tautology, then A is said to be
    a) logically imply B
    b) logical sequence of B
    c) logically equivalence to B
    d) none of the above

24. " is a real number " is
    a) conjunction
    b) disjunction
    c) predicate
    d) tautology

25. In conditional table, $p \rightarrow q$ is false when and only when
    a) p is false but q is true
    b) p is true but q is false
    c) p and q is true
    d) p and q is false

26. The operational symbols, $\sim$, $\wedge$,$\vee$, $\rightarrow$, $\leftrightarrow$ are called
    a) implication
    b) conjunction
    c) connectives
    d) none of the above

27. If P and Q are statements, a well formed formula is
    a) ד$(P \wedge Q)$
    b) ד$P \wedge Q$
    c) $(P \rightarrow Q) \rightarrow (\wedge Q)$
    d) $(P \rightarrow Q)$

28. $P \vee$ דP is equivalent to
    a) P
    b) $P \wedge$ דP
    c) $Q \vee$ דQ
    d) Q

29. "Staetement" is a declarative sentence that can be classified as
    a) true or false
    b) true or false but not both
    c) true and false
    d) none of the above

30. A $\equiv$ B if and only if they have
    a) same truth tables

b) different truth tables
c) same values
d) none of the above

31. The co-efficient of x^7 in the expansion of $\left(x^2 + \frac{1}{x}\right)^{11}$ is
    a) 643
    b) 374
    c) 365
    d) 462

32. The 3rd term in the expansion of $\left(3x - \frac{y^3}{6}\right)^4$ is
    a) $\frac{2}{3}xy^3$
    b) $\frac{12}{5}xy^{-2}$
    c) $-\frac{3}{2}x^3y^5$
    d) $\frac{3}{2}x^2y^6$

33. The term independent of x in the expansion of $\left(x^2 + \frac{1}{x}\right)^9$ is
    a) 76
    b) 84
    c) 96
    d) 68

34. If $n_{P_4} = 20 \times n_{P_2}$ then the value of n is
    a) 7
    b) 6
    c) 4
    d) 8

35. Binomial expansion of $(a + b)^n$ has
    a) n terms
    b) (n - 1) terms
    c) (n + 1) terms
    d) none of the above

36. 0 ! is equal to
    a) 0
    b) 1
    c) -1
    d) none of the above

37. The number of permutations of the letters of the word 'APPLE' is
    a) 60
    b) 70
    c) 80

d) 50

38. $9_{P_3} + 3 \times 9_{P_2} = ?$
    a) 504
    b) 1848
    c) 720
    d) 845

39. The number of ways 5 persons occupy 3 vacant seats is
    a) 15
    b) 60
    c) 35
    d) 50

40. If $n_{P_r} = 720$ and $n_{C_r} = 120$, then r is equal to
    a) 4
    b) 5
    c) 2
    d) 3

41. In the expansion of $(x + y)^n, t_{r+1} = ?$
    a) $n_{C_r} x^r y^2$
    b) $n_{C_r} x^{n-r} y^r$
    c) $n_{C_r} x y^r$
    d) $n_{C_r x^r y}$

42. The 10th term in the expansion of $\left(2x^2 + \frac{1}{x}\right)^{12}$ is
    a) $\frac{2734}{x^6}$
    b) $\frac{1862}{x^{12}}$
    c) $\frac{1538}{x^4}$
    d) $\frac{1760}{x^3}$

43. The number of ways a committee of 5 members selected from 6 men and 5 ladies, consisting of 3 men and 2 ladies is
    a) 100
    b) 200
    c) 300
    d) 400

44. $11_{C_4} = ?$
    a) 220
    b) 110
    c) 330

d) 440

45. The number of permutations of n different objects taken r at a time, where repetition is allowed is
    a) r^n
    b) r n
    c) $\frac{r}{n}$
    d) n^r

46. An integer greater than or equal to 2 that is not prime is
    a) odd
    b) even
    c) composite
    d) none of the above

47. gcd (18, 30) = ?
    a) 6
    b) 8
    c) 4
    d) 2

48. Two numbers are relatively prime if they have a greatest common divisor of
    a) 2
    b) 1
    c) 3
    d) 4

49. If $\frac{a}{bc}$ and a is relatively prime to b, then
    a) $\frac{a}{b}$
    b) $\frac{b}{a}$
    c) $\frac{c}{a}$
    d) $\frac{a}{c}$

50. If a $>$0, then gcd (a, 0) =?
    a) a
    b) 0
    c) 1
    d) 2

51. The inverse of 3 modulo 7 is
    a) -1
    b) -2
    c) -3
    d) -4

52. Out of the following which of these integers is not prime
    a) 21
    b) 71
    c) 101
    d) 35

53. Which positive integer less than 21 are relatively prime to 21
    a) 18
    b) 19
    c) 21
    d) 24

54. If gcd (3, 21) = 3, then the lcm of 3 and 21 is
    a) 3
    b) 12
    c) 21
    d) 42

55. Let m be a positive integer, then an element a $\epsilon\ \mathbb{Z}_m$ is invertible if and only if gcd(a, m) = ?
    a) 0
    b) 1
    c) 2
    d) 3

56. An integer a and b, if m divides (b- a) where m is a positive integer, then a is congruent to
    a) a modulo m
    b) m modulo a
    c) b modulo m
    d) m modulo b

57. If gcd (a, m)=1, then ab $\equiv$ ac mod m if and only if
    a) a $\equiv$ b mod m
    b) b $\equiv$ a mod m
    c) a $\equiv$ c mod m
    d) b $\equiv$ c mod m

58. For a, b $\epsilon\ \mathbb{Z}$, a positive integer c is said to be a common divisor of a and b if
    a) $\frac{c}{a}$ & $\frac{c}{b}$
    b) $\frac{a}{c}$ & $\frac{b}{c}$
    c) $c \times a$ & $c \times b$
    d) $a \times b$ & $b \times c$

59. If r is the remainder when a is divided by b, then gcd (a, b) = ?
    a) gcd (a, r)
    b) gcd (b, r)

c) gcd (0, r)
d) gcd (1, r)

60. lcm (a, b) = ab if and only if a & b are
    a) prime
    b) intgers
    c) real
    d) relatively prime

61. A graph in which every edge is directed is called
    a) mixed path
    b) digraph
    c) simple graph
    d) path connected graph

62. A path in a digraph in which the edges are all distinct is
    a) simple path
    b) cycle
    c) circuit
    d) node simple

63. The total number of edges in a complete graph of n vertices is
    a) n
    b) $\frac{n(n-1)}{2}$
    c) $\frac{n}{2}$
    d) $n^2 - 1$

64. If a graph G is bipartite, then the chromatic number (χ) of G is
    a) 1
    b) 3
    c) 0
    d) 2

65. In a graph, the total degree of an isolated node is
    a) 1
    b) 0
    c) no degree
    d) $\frac{1}{2}$

66. In a simple digraph, the length of any elementary cycle with n nodes
    a) is n
    b) exceeds n
    c) does not exceed n
    d) is n +1

67. Let G be a connected graph with n vertices, then the number of edges in the spanning tree of G is
    a) n
    b) $\frac{n}{2}$
    c) n -1
    d) $\frac{n(n-1)}{2}$

68. A node is called dangle node if its degree is
    a) 0
    b) 1
    c) 2
    d) 3

69. A tree with n vertices has
    a) n edges
    b) (n+1) edges
    c) (n-1) edges
    d) (n +2) edges

70. If some closed walk in a graph contains all the edges of the graph, then the walk is called
    a) Hamiltonian line
    b) Euler line
    c) Shortest path
    d) None of the above

71. A graph G with n vertices is called a tree if
    a) G is connected and has (n +1) edges
    b) G is circuitless and has (n -1) edges
    c) G is not connected and is circuitless
    d) G is not minimally connected graph

72. Every tree has
    a) one center
    b) two centers
    c) either one or two centers
    d) no center

73. Every connected graph has at least
    a) one spanning tree
    b) two spanning tree
    c) three spanning tree
    d) four spanning tree

74. If connected graph G is Eulerian, then every vertex of G has
    a) zero degree
    b) even degree
    c) odd degree
    d) none of the above

75. Unlike many other algorithms, Prim's algorithm always finds
    a) minimum spanning tree
    b) a node
    c) an arc
    d) optimal spanning tree

B. Fill up the blanks [15 (3 from each unit)]

1. Pictorial representation to express the relationship among sets is called _____
2. A set containing exactly one element is called _____
3. In a Boolean algebra B, for each aϵ B, (a')' =_____
4. A statement formula which is neither a tautology nor a contradiction is called a _____
5. If $\vDash A$ and $\vDash A \rightarrow B$, then_____
6. The operation 'biconditional' combines two statements p and q to form new statement _____
7. In a binomial theorem, when n is even, the middle term is _____
8. The number of ways in which n persons can be seated round a table is _____
9. If (n + 1) ! = 12 $\times$ $(n-1)$! then the value of n is _____
10. 1 is neither _____ nor composite
11. If a $>$ 0, then gcd (a, a) is equal to _____
12. Slow division algorithms produce _____ of the final quotient per iteration
13. The pair of nodes joined by an arc is called _____ of the arc
14. Sum of degrees of all nodes in a graph is equal to _____ the number of edges in the graph
15. Every tree has only _____ root

Key Answers

A. Multiple choice questions

1. c)	2. a)	3. d)	4.c)	5. b)	6.c)	7. c)
8. b)	9. a)	10. d)	11. c)	12. b)	13.b)	14. a)
15. c)	16. a)	17. c)	18. c)	19. a)	20. d)	21. c)
22. b)	23. a)	24. c)	25. b)	26. c)	27. d)	28. c)
29. b)	30. a)	31. d)	32. d)	33. b)	34. a)	35. c)
36. b)	37.a)	38. c)	39. b)	40. d)	41. b)	42. d)
43. b)	44. c)	45. d)	46. c)	47. a)	48. b)	49. d)
50. a)	51. b)	52. d)	53. b)	54. c)	55. b)	56. c)
57. d)	58. a)	59. b)	60. d)	61. b)	62. a)	63. b)
64. d)	65. b)	66. c)	67. c)	68. b)	69. c)	70. b)
71. b)	72. c)	73. a)	74. b)	75. d)		

B. Fill up the blanks
1. Venn diagram
2. Singleton set

3. a
4. contingent
5. $\vDash B$
6. p if and only if q
7. $\left(\frac{n}{2}+1\right)$th term
8. $(n-1)$!
9. 3
10. prime
11. a
12. one digit
13. end points
14. twice
15. one