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Roll No. _____

O.M.R. Serial No. :

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Question Booklet Number

3669479

BCA II Semester Examination, 2025-26

Mathematics for Computer Applications

Paper Code

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Question Booklet Series

C

Time : 1 : 30 Hours]

[Maximum Marks : 75

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. 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 got immediately replaced.
4. Four alternative answers are mentioned for each question as – A, B, C & D in the booklet. The candidate has to choose the correct answer and mark the same in the OMR Answer-Sheet as per the direction :

(Remaining instructions on the last page)

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।
3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गये हों या प्रश्न एक से अधिक बार छप गये हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।
4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर- A, B, C तथा D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छँटना है। उत्तर को OMR उत्तर-पत्रक में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

(शेष निर्देश अन्तिम पृष्ठ पर)

1. Let $D_{30} = \{1, 2, 3, 5, 6, 10, 15, 30\}$ and relation "a divides b" be a partial ordering on D_{30} . The least upper bound of 6 and 15 is:
 - (A) 6
 - (B) 10
 - (C) 15
 - (D) 30
2. If two posets are isomorphic, they have:
 - (A) Same number of elements
 - (B) Different structure
 - (C) No relation
 - (D) None of these
3. A complemented lattice must have:
 - (A) Every element with a unique complement
 - (B) Only one complement
 - (C) No complement
 - (D) None of these
4. A self-complemented distributive lattice is called:
 - (A) Self-dual lattice
 - (B) Modular lattice
 - (C) Complete lattice
 - (D) Boolean Algebra
5. If $a \leq b$ and $b \leq c$, then $a \leq c$ represents:
 - (A) Reflexivity
 - (B) Symmetry
 - (C) Transitivity
 - (D) Antisymmetry
6. In a lattice $a \vee a =$
 - (A) 0
 - (B) a
 - (C) 1
 - (D) Undefined
7. $a \wedge (b \vee c) = (a \wedge b) \vee (a \wedge c)$ is:
 - (A) Associative law
 - (B) Commutative law
 - (C) Distributive
 - (D) None of these

8. In a lattice, $a \vee b$ denotes:
- (A) Join of a and b
 - (B) Meet of a and b
 - (C) Least element
 - (D) None of these
9. A set $S = \{1, 2, 4, 8\}$ and $\leq$ be the partial order define $S \leq R$ if 'a divides b'. Number of edges in the Hasse diagram of:
- (A) 5
 - (B) 8
 - (C) 4
 - (D) 3
10. $a \wedge (a \vee b) = a$ is:
- (A) Absorption law
 - (B) Distributive law
 - (C) Identity
 - (D) None of these
11. A well-ordered set has:
- (A) Least element in every subset
 - (B) Greatest element
 - (C) Maximal element
 - (D) None of these
12. $a \vee b = b \vee a$ is:
- (A) Associative law
 - (B) Commutative law
 - (C) Distributive law
 - (D) None of these
13. Which of the following relation is a partial order as well as an equivalence relation:
- (A) Equal to ($=$)
 - (B) Less than ($<$)
 - (C) Greater than ($>$)
 - (D) Not equal to ($\neq$)
14. Which laws are satisfied for a lattice:
- (A) Associative law
 - (B) Commutative law
 - (C) Absorption law
 - (D) All of them mention
15. A relation R on set A is antisymmetric if:
- (A) $(a, b) \in R$ and $(b, a) \in R \Rightarrow a = b$
 - (B) $(a, b) \in R$ and $(b, a) \in R \Rightarrow a \neq b$
 - (C) $(a, b) \in R \Rightarrow (b, a) \in R$
 - (D) $(a, b) \in R$

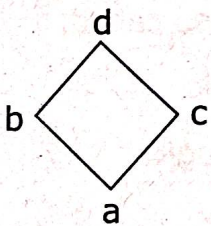
16. A finite lattice has:

- (A) Least element
- (B) Greatest element
- (C) Both least element and greatest element
- (D) None of these

17. Consider Poset $P = \{1, 2, 3, 4, 6, 12\}$ of factors of 12 under divisibility, then the greatest element of P is:

- (A) 1
- (B) 2
- (C) 6
- (D) 12

18. Which element is minimal in the following diagram:



- (A) d
- (B) a
- (C) b
- (D) c

19. The Hasse diagram is used to represent:

- (A) Function
- (B) Group
- (C) Poset
- (D) None of these

20. Which of the following is not a property of a partial order relation:

- (A) Reflexive
- (B) Transitive
- (C) Antisymmetric
- (D) Symmetric

21. $p \wedge (q \vee r) = (p \wedge q) \vee (p \wedge r)$ is:

- (A) Distributive law
- (B) Identity law
- (C) Commutative law
- (D) Associative law

22. If $p = \text{True}$ and $q = \text{False}$, the truth value of $p \rightarrow q$ is:
- (A) True
 - (B) False
 - (C) Cannot determine
 - (D) None of these
23. A statement that is sometimes 'true' and sometimes 'false' is:
- (A) Tautology
 - (B) Contradiction
 - (C) Contingency
 - (D) None of these
24. $p \wedge \neg p$ is
- (A) Tautology
 - (B) Contradiction
 - (C) Contingency
 - (D) None of these
25. Quantifiers apply to:
- (A) Predicates
 - (B) Propositions
 - (C) Operations
 - (D) None of these
26. Statement $\exists x p(x)$ means:
- (A) $p(x)$ true for at least one x
 - (B) $p(x)$ true for all x
 - (C) $p(x)$ false
 - (D) None of these
27. Negation of $\forall x p(x)$ is:
- (A) $\forall x \neg p(x)$
 - (B) $\exists x \neg p(x)$
 - (C) $\forall x p(x)$
 - (D) None of these
28. "There exists x " means:
- (A) Existential quantifier
 - (B) Universal quantifier
 - (C) Predicate
 - (D) None of these
29. Universal quantifier is denoted by:
- (A) $\exists$
 - (B) $\forall$
 - (C) $\wedge$
 - (D) $\vee$
30. Predicate logic is also called:
- (A) First-order logic
 - (B) Propositional logic
 - (C) Modal logic
 - (D) None of these
31. Valid arguments are based on:
- (A) Functions
 - (B) Operations
 - (C) Rules of inference
 - (D) None of these

32. Normal form 'CNF' means:
- (A) Canonical normal form
 - (B) Conditional normal form
 - (C) Conjunctive normal form
 - (D) None of these
33. If $p \rightarrow q$ and $q \rightarrow r$, then:
- (A) $r \rightarrow p$
 - (B) $q \rightarrow p$
 - (C) $p \rightarrow r$
 - (D) None of these
34. Biconditional is denoted by:
- (A) $\rightarrow$
 - (B) $\leftrightarrow$
 - (C) $\wedge$
 - (D) $\vee$
35. Logically 'AND' is denoted by:
- (A) $\leftrightarrow$
 - (B) $\vee$
 - (C) $\rightarrow$
 - (D) $\wedge$
36. Two propositions are logically equivalence means they have:
- (A) Same truth table
 - (B) Same variable
 - (C) Same operation
 - (D) None of these
37. A proposition that is false for every possible assignment of truth values is a:
- (A) Tautology
 - (B) Contradiction
 - (C) Hypothesis
 - (D) None of these
38. Negation of True is:
- (A) 1
 - (B) False
 - (C) True
 - (D) None of these
39. If $p \wedge q$ is true, when:
- (A) Both p and q true
 - (B) Both p and q false
 - (C) One true
 - (D) None of these
40. A statement always true is:
- (A) Predicate
 - (B) Contradiction
 - (C) Contingency
 - (D) Tautology
41. If $f: \mathbb{Z} \rightarrow \mathbb{Z}$ (set of integers) defined by $f(x) = 2x$, then f is:
- (A) Homomorphism
 - (B) Isomorphism
 - (C) Automorphism
 - (D) None of these

42. The image of identity element under homomorphism is:
- (A) Identity element
 - (B) Any element
 - (C) Inverse element
 - (D) None of these
43. Isomorphism is:
- (A) One-one onto homomorphism
 - (B) One-one homomorphism
 - (C) Onto homomorphism
 - (D) None of these
44. Automorphism is:
- (A) Homomorphism
 - (B) Subgroup
 - (C) Isomorphism from group to itself
 - (D) None of these
45. Order of Permutation group S_3 is:
- (A) 3
 - (B) 6
 - (C) 8
 - (D) None of these
46. If $aH=bH$, then:
- (A) $a=b$
 - (B) $a^{-1}.b \in H$
 - (C) $a.b \in H$
 - (D) None of these
47. If 'a' generates G, then a^{-1} is:
- (A) Not a generator
 - (B) Identity
 - (C) Also a generator
 - (D) None of these
48. Left coset defined as:
- (A) aH
 - (B) Ha
 - (C) H
 - (D) None of these
49. Let $(G,*)$ be a group, then for all a, b in G.
- $(a*b)^{-1}=?$
- (A) $a^{-1}*b^{-1}$
 - (B) $a^{-1}*b$
 - (C) $a*b$
 - (D) $b^{-1}*a^{-1}$
50. The Intersection of two subgroup of G is:
- (A) Not subgroup
 - (B) Cyclic group
 - (C) Trivial group
 - (D) Subgroup

51. Every cyclic group is:
- (A) Abelian
 - (B) Non-abelian
 - (C) Infinite
 - (D) None of these
52. The order of group G is:
- (A) The sum of all elements in the group
 - (B) The number of elements in the group
 - (C) The product of all elements in the group
 - (D) None of these
53. The Identity element in a group is:
- (A) Unique
 - (B) Not unique
 - (C) Two exist
 - (D) None of these
54. Identity element of the Group R (Set of Real numbers) under addition is:
- (A) 1
 - (B) 2
 - (C) 0
 - (D) -1
55. For any set S if $a*b=b*a, \forall a,b \in S$, then * is said to be:
- (A) Associative
 - (B) Distributive
 - (C) Commutative
 - (D) None of these
56. A monoid is a semigroup that also has:
- (A) Commutative
 - (B) Identity element
 - (C) Inverses of every element
 - (D) Zero element
57. The set of Natural number N with respect to addition is:
- (A) Monoid
 - (B) Semigroup
 - (C) Group
 - (D) None of these
58. Associative property means:
- (A) $a(bc)=(ab)c$
 - (B) $ab=ba$
 - (C) $a=b$
 - (D) None of these
59. Let Group $G=Q^+$ (set of all positive rational numbers) and $a*b = \frac{ab}{2}, \forall a,b \in Q^+$. The identity element G of:
- (A) 0
 - (B) 1
 - (C) 2
 - (D) 3

60. Let $G = \{1, -1, i, -i\}$ is group under multiplication then the inverse of 'i' is:
- (A) 1
(B) -1
(C) i
(D) -i
61. The recurrence relation $a_n = na_{n-1}$ and $a_1 = 1$ then $a_n =$
- (A) n
(B) n!
(C) 2^n
(D) None of these
62. Recurrence relation without constant coefficient has:
- (A) Constant coefficients
(B) Variable coefficients
(C) No coefficients
(D) None of these
63. If $a_n = a_{n-2} + 2$ and $a_1 = 1$ then $a_3 =$
- (A) 3
(B) 5
(C) 6
(D) 7
64. Degree of the recurrence relation $a_n^3 + 2a_{n-1} = 0$ is:
- (A) 1
(B) 2
(C) 3
(D) None of these
65. If $a_n = 2a_{n-1}$, $a_1 = 2$ then $a_n =$
- (A) n
(B) 2
(C) n^2
(D) 2^n
66. Order of recurrence relation $a_n - 2a_{n-1} + a_{n-2} = 0$ is:
- (A) 1
(B) 4
(C) 3
(D) 2
67. The recurrence relation $a_n - 3a_{n-1} + 2a_{n-2} = 0$ is:
- (A) Homogeneous recurrence relation
(B) Non homogeneous recurrence relation
(C) Non linear recurrence relation
(D) None of these

68. The coefficient of x^n in the expansion

$\frac{1}{1-x}$ is:

(A) n

(B) 2^n

(C) n^2

(D) 1

69. The degree of linear recurrence relation is:

(A) 1

(B) 0

(C) 2

(D) None of these

70. If $a_n = b^n$, The generating function $G(x)$ is:

(A) $\frac{1}{1-nx}$

(B) $\frac{1}{1-bx}$

(C) $\frac{b}{1-x}$

(D) None of these

71. If generating function $G(x) = \frac{x}{(1-x)^2}$, the sequence is:

(A) $1, 1, 1, 1, \dots$

(B) $0, 1, 1, 1, \dots$

(C) $1, 2, 3, 4, \dots$

(D) None of these

72. If the generating function

$G(x) = \frac{1}{1-2x}$, then what is the n^{th}

term of the sequence?

(A) n

(B) n^2

(C) 2^n

(D) 1

73. Generating function is a:

(A) Polynomial vector

(B) Power series

(C) Matrix

(D) None of these

74. In a proof by Induction, the first step is to:

(A) Assume the statement is true for $k+1$

(B) Prove the statement for $n=1$

(C) Add n and $n+1$ cases

(D) None of these

75. If ' n ' is a natural numbers then $n(n+1)$ is divisible by:

(A) 4

(B) 3

(C) 2

(D) None of these

76. For any natural number 'n', $7^n - 2^n$ is divisible by:
- (A) 3
 - (B) 4
 - (C) 5
 - (D) 7
77. What is the sum of $1+2+3+\dots+n$ is:
- (A) $\frac{n+1}{2}$
 - (B) $\frac{n}{2}$
 - (C) $\frac{n(n+2)}{2}$
 - (D) $\frac{n(n+1)}{2}$
78. Principle of Mathematical induction is based on:
- (A) Peano's axioms
 - (B) Calculus
 - (C) Geometry
 - (D) None of these
79. Mathematical induction proves statements for:
- (A) Integers
 - (B) Natural numbers
 - (C) Real numbers
 - (D) Rational numbers
80. If $f: \mathbb{Z} \rightarrow \mathbb{Z}$ (set of integers) be defined by $f(x) = x^2 + x - 1$, then $f(f(-1))$ is equal to:
- (A) -2
 - (B) 1
 - (C) 3
 - (D) -1
81. If function $f: \mathbb{Q} \rightarrow \mathbb{Q}$ is defined by the relation $f(x) = 3x - 4$, $x \in \mathbb{Q}$ where $\mathbb{Q}$ be the set of rational numbers, then f is:
- (A) Many one-into mapping
 - (B) Many one-onto mapping
 - (C) One-one into mapping
 - (D) One-one onto mapping
82. If $f(x) = 5x + 10$ and $g(x) = 3x - 1$, then the value of $f \circ g(x)$ is:
- (A) $15x + 9$
 - (B) $15x + 15$
 - (C) $15x + 5$
 - (D) None of these
83. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = 3x - 5$ is one-one onto mapping then $f^{-1}(x)$ is given by:
- (A) $3x - 5$
 - (B) $6x + 2$
 - (C) $5x - 3$
 - (D) $\frac{x+5}{3}$

84. If $f(x) = x^2 - \frac{1}{x^2}$, then $f(x) + f\left(\frac{1}{x}\right)$ is equal to:
- $2x^2$
 - $\frac{2}{x^2}$
 - 0
 - None of these
85. If $f:A \rightarrow B$ is one-one and onto function then $f^{-1}:B \rightarrow A$ is:
- One-one but not onto
 - One-one onto
 - Onto but not one-one
 - None of these
86. Let R and S be two equivalence relation on a set A , then
- $R \cup S$ is an equivalence relation
 - $R \cap S$ is an equivalence relation
 - $R - S$ is an equivalence relation
 - None of these
87. Let R be the relation from the non-empty set A to a non empty set B is:
- $R \subseteq A \cup B$
 - $R \subseteq A \cap B$
 - $R \subseteq A \times B$
 - None of these
88. Let $A = \{1, 2, 3, 4\}$, $R = \{(3,3), (4,4), (1,2)\}$ is a Relation on A R is:
- Reflexive relation
 - Symmetric relation
 - Equivalence relation
 - None of these
89. The relation R in the set of integers given by $R = \{(a,b): a-b \text{ is divisible by } 3\}$ is:
- Reflexive only
 - Equivalence relation
 - Reflexive but not symmetric
 - Symmetric but not transitive
90. A relation R on a set A is symmetric, if only if:
- $R^{-1} \subseteq R$
 - $R \subseteq R^{-1}$
 - $R = R^{-1}$
 - None of these
91. A relation R is said to be an equivalence relation if it is:
- Reflexive only
 - Symmetric only
 - Reflexive, symmetric and transitive
 - Transitive only
92. In a group of 52 persons, 16 drinks tea but not coffee, while 33 drinks tea. How many persons drink coffee but not tea.
- 35
 - 17
 - 19
 - 36

93. If the set A has p-elements, B has q-elements and then the number of elements in $A \times B$ is:
- (A) $pq+1$
 (B) pq
 (C) $p+q$
 (D) $p+q+1$
94. If $A = \{1, 2, 3, 4, 5\}$ and $B = \{2, 5, 8, 9\}$ then $n(A \cup B)$ is equal to:
- (A) 6
 (B) 8
 (C) 9
 (D) 7
95. If A, B, and C are any three sets, then $A - (B \cap C)$ is equal to:
- (A) $(A - B) \cap (A - C)$
 (B) $(A - B) \cap C$
 (C) $(A - B) \cup C$
 (D) $(A - B) \cup (A - C)$
96. Let A and B be two sets such that $n(A) = 0.16$, $n(B) = 0.14$, $n(A \cup B) = 0.25$, Then $n(A \cap B)$ is equal to:
- (A) 0.3
 (B) 0.5
 (C) 0.05
 (D) None of these
97. If A, B, C are three sets, then $A \cap (B \cup C)$ is equal to:
- (A) $(A \cup B) \cap (A \cup C)$
 (B) $(A \cup B) \cup (A \cap C)$
 (C) $(A \cap B) \cup (A \cap C)$
 (D) None of these
98. If A, B, C, be three sets such that $A \cup B = A \cup C$ and $A \cap B = A \cap C$, then
- (A) $A = C$
 (B) $B = C$
 (C) $A = B = C$
 (D) $A = B$
99. If A contains n elements, then the number of elements in power set A is:
- (A) n
 (B) $2n$
 (C) n^2
 (D) 2^n
100. If $A \subset B$, then $A \cap B$ is equal to:
- (A) A
 (B) B
 (C) ϕ
 (D) None of these