**JK**

**Roll No.** _____

| Question Booklet Number |
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**O.M.R. Serial No. :**

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# BCA II Semester Examination, 2025-26

## Mathematics for Computer Applications

| Paper Code | | | | | | | |
|---|---|---|---|---|---|---|---|
| B | C | A | 2 | 0 | 0 | 3 | T |

| 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 procee(D) Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replace(D)
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 गए 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 छाँटना है। उत्तर को OMR उत्तर-पत्रक में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

***(शेष निर्देश अन्तिम पृष्ठ पर)***

**Rough Work**

रफ कार्य

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:

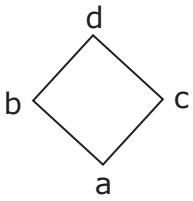
(A) 1

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

(A) Distributive law

(B) Identity law

(C) Commutative law

(D) Associative law

22. If p=True and q=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 $f:z \rightarrow z$ (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 $a * b = \frac{ab}{2}, \forall\, a, b \epsilon Q^+$. 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 .....

(B) 0,1,1,1 .....

(C) 1,2,3,4 .....

(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+.....+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) Peono'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 $f:z\rightarrow z$ (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 $f:Q\rightarrow Q$ is defined by the relation $f(x)=3x-4$, $x\in Q$ where 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 fog(x) is:

(A) 15x+9

(B) 15x+15

(C) 15x+5

(D) None of these

83. Let $f:R\rightarrow R$ 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:

(A) $2x^2$

(B) $\frac{2}{x^2}$

(C) 0

(D) None of these

85. If $f: A \to B$ is one-one and onto function then $f^{-1}: B \to A$ is:

(A) One-one but not onto

(B) One-one onto

(C) Onto but not one-one

(D) None of these

86. Let R and S be two equivalence relation on a set A, then

(A) $R \cup S$ is an equivalence relation

(B) $R \cap S$ is an equivalence relation

(C) R–S is an equivalence relation

(D) None of these

87. Let R be the relation from the non-empty set A to a non empty set B is:

(A) $R \subseteq A \cup B$

(B) $R \subseteq A \cap B$

(C) $R \subseteq A \times B$

(D) None of these

88. Let A={1, 2, 3, 4}, R={(3,3), (4,4), (1,2)} is a Relation on A R is:

(A) Reflexive relation

(B) Symmetric relation

(C) Equivalence relation

(D) None of these

89. The relation R in the set of integers given by R={(a,b):a–b is divisible by 3} is:

(A) Reflexive only

(B) Equivalence relation

(C) Reflexive but not symmetric

(D) Symmetric but not transitive

90. A relation R on a set A is symmetric, if only if:

(A) $R^{-1} \subset R$

(B) $R \subset R^{-1}$

(C) $R = R^{-1}$

(D) None of these

91. A relation R is said to be an equivalence relation if it is:

(A) Reflexive only

(B) Symmetric only

(C) Reflexive, symmetric and transitive

(D) 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.

(A) 35

(B) 17

(C) 19

(D) 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) $\phi$

(D) None of these

**Rough Work**

रफ कार्य

***Example :***

**Question :**

**Q. 1** (A) ● (C) (D)

**Q. 2** (A) (B) ● (D)

**Q. 3** (A) ● (C) (D)

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered vali(D)
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager & cellular phone in examination hall is prohibite(D)
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authenti(C)

**Impt. On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question booklet, then after showing it to the invigilator, get another question booklet of the same series.**

*उदाहरण :*

**प्रश्न :**

**प्रश्न 1** (A) ● (C) (D)

**प्रश्न 2** (A) (B) ● (D)

**प्रश्न 3** (A) ● (C) (D)

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ.एम.आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
7. ओ.एम.आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा कक्ष में लॉग-बुक, कैल्कुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

**महत्वपूर्ण : प्रश्न-पुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्न-पुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सीरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।**