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Roll No. \_\_\_\_\_

O.M.R. Serial No. :

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Question Booklet Number

3768588

## BCA II Semester (NEP Back Paper)

Examination, 2025-26

Mathematics-II

Paper Code

B C A 2 0 0 5

Question Booklet Series

D

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 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 छँटना है। उत्तर को OMR उत्तर-पत्रक में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

(शेष निर्देश अन्तिम पृष्ठ पर)

1. In a Hasse diagram for the power set  $P(\{a,b,c\})$  under the subset relation  $\subseteq$ , how many maximal elements are there?  
 (A) 1  
 (B) 3  
 (C) 8  
 (D) 0
2. An element  $a$  in a lattice  $L$  is a complement of  $b$  if  
 (A)  $a \vee b = 1$  and  $a \wedge b = 0$   
 (B)  $a \vee b = 0$  and  $a \wedge b = 1$   
 (C)  $a \leq b$   
 (D)  $a = b'$
3. The dual of the statement  $a \vee (b \wedge a) = a$  in lattice theory is:  
 (A)  $a \wedge (b \vee a) = a$   
 (B)  $a \vee (b \wedge a) = b$   
 (C)  $a \wedge (b \vee a) = b$   
 (D)  $a \vee b = a \wedge b$
4. A lattice is said to be 'complemented' if it is bounded and  
 (A) Every element has at least one complement.  
 (B) Every element has exactly one complement.  
 (C) It is distributive.  
 (D) It is a finite chain.
5. A subset of a POSET where every two elements are comparable is called a:  
 (A) Anti-chain  
 (B) Chain  
 (C) Lattice  
 (D) Sub-lattice
6. In a Hasse diagram, an element  $x$  is called a 'minimal element' if:  
 (A) It is less than every other element in the set.  
 (B) No element  $y$  exists such that  $y < x$ .  
 (C) It is the GLB of the entire POSET.  
 (D) It is connected to the top element.
7. A lattice  $L$  is called a Distributive Lattice if for all  $a, b, c \in L$ .  
 (A)  $a \vee (b \wedge c) = (a \vee b) \wedge (a \vee c)$   
 (B)  $a \vee b = b \vee a$   
 (C)  $a \wedge (a \vee b) = a$   
 (D)  $a \vee 1 = 1$
8. Consider the divisibility lattice of divisors of 30. What is the Least Upper Bound (LUB) of the set  $\{6, 10\}$ ?  
 (A) 60  
 (B) 30  
 (C) 15  
 (D) 2
9. Consider the divisibility lattice of divisors of 30. What is the Greatest Lower Bound (GLB) of the set  $\{6, 10\}$ ?  
 (A) 30  
 (B) 2  
 (C) 1  
 (D) 5
10. In the POSET  $(\{1, 2, 3, \dots, 12\}, |)$  where  $|$  denotes divisibility, which elements are connected directly above 2 in a Hasse diagram?  
 (A) 4 and 6  
 (B) 1  
 (C) 12  
 (D) 3

11. If  $|A|=m$  and  $|B|=n$ , the total number of functions from A to B is:
- $m^n$
  - $n^m$
  - $2^{mn}$
  - $m \cdot n$
12. The set of all ordered pairs  $(a,b)$  such that "a is the brother of b" is a relation that is:
- Reflexive
  - Symmetric
  - Transitive
  - Equivalence
13. If  $f(x)=x+3$  and  $g(x)=x-3$ , then  $f \circ g$  is:
- $x^2-9$
  - $x$
  - $2x$
  - 0
14. The number of reflexive relations on a set A with  $|A|=3$  is:
- 8
  - 64
  - 512
  - 9
15. A relation R that is reflexive, anti-symmetric, and transitive is a:
- Equivalence Relation
  - Partial Order Relation
  - Total Relation
  - Symmetric Relation
16. How many binary relations are possible on a set A with n elements:
- $2^n$
  - $n^2$
  - $2^{n^2}$
  - $n^n$
17. If  $f: A \rightarrow B$  is bijection, then the domain of  $F^{-1}$  is:
- A
  - B
  - $A \cap B$
  - $\emptyset$
18. The identity function I on set A is defined as:
- $I(a)=0$
  - $I(a)=1$
  - $I(a)=a$
  - $I(a)=a^2$
19. A function  $f: A \rightarrow B$  is called an 'into' function if:
- Range of  $f \subset B$
  - Range of  $f = B$
  - f is bijective
  - f is one-to-one
20. If  $R = \{(1,2), (2,3), (1,3)\}$  on the set  $A = \{1,2,3\}$  the relation R is:
- Reflexive
  - Symmetric
  - Transitive
  - Equivalence

21. The range of the function  $f(x)=x^2$  (domain is the set of all real numbers  $R$ ) is:  
 (A)  $R$   
 (B)  $(-\infty, \infty)$   
 (C)  $[0, \infty)$   
 (D)  $(0, \infty)$
22. A relation  $R$  on set  $A$  is antisymmetric if  $(a,b) \in R$  and  $(b,a) \in R$  implies:  
 (A)  $a+b=0$   
 (B)  $a=b$   
 (C)  $a=-b$   
 (D)  $R=a*b$
23. Given the function  $f(x)=2x+1$  and  $g(x)=x^2$ , find the composite function go  $f(x)$ :  
 (A)  $2x^2+1$   
 (B)  $(2x+1)^2$   
 (C)  $2x^2+2$   
 (D)  $4x^2+1$
24. Let  $f(x) = \frac{x-1}{x+1}$  for  $x \neq -1$ , The inverse function is  $f^{-1}(x)$  is :  
 (A)  $\frac{1+x}{1-x}$   
 (B)  $\frac{-1+x}{1-x}$   
 (C)  $\frac{1-x}{1+x}$   
 (D)  $\frac{2x}{1-x}$
25. If a function is both injective and surjective, it is called:  
 (A) Into  
 (B) Bijective  
 (C) Constant  
 (D) Identity
26. A function  $f: A \rightarrow B$  is surjective (onto) if:  
 (A) The range of  $f$  is equal to  $B$ .  
 (B) Different elements in  $A$  map to different elements in  $B$ .  
 (C) It has an inverse.  
 (D)  $A=B$ .
27. A function  $f: A \rightarrow B$  is called injective (one-to-one) if:  
 (A)  $f(a)=f(b) \Rightarrow a=b$   
 (B) Every  $b \in B$  has a pre-image in  $A$ .  
 (C) The range equals the codomain.  
 (D) It is both onto and into.
28. For a function  $f: A \rightarrow B$ , the set  $A$  is known as the:  
 (A) Codomain  
 (B) Range  
 (C) Domain  
 (D) Image
29. If a relation  $R$  is reflexive, symmetric, and transitive, it is classified as:  
 (A) A Partial Order Relation  
 (B) An Equivalence Relation  
 (C) An Anti-symmetric Relation  
 (D) An Inverse Relation
30. A relation  $R$  on a set  $A$  is reflexive if:  
 (A)  $\forall a \in A, (a,a) \in R$   
 (B)  $\forall a, b \in A, (a,b) \in R \Rightarrow (b,a) \in R$   
 (C)  $\forall a, b, c \in A, (a,b) \in R$  and  $(b,c) \in R \Rightarrow (a,c) \in R$   
 (D)  $R=\emptyset$

31. In Venn diagrams, the intersection of two sets is visually represented by the:
- Total area of both circles.
  - Overlapping region of the two circles.
  - Area outside the circles.
  - Rectangle surrounding the circles.
32. Which of the following represents the Empty Set?
- $\{0\}$
  - $\emptyset$
  - $\{\emptyset\}$
  - $\{x; x=x\}$
33. If  $|A|=3$  and  $|B|=2$ , and A and B are disjoint, how many elements are in the Power Set  $P(A \cup B)$ ?
- 5
  - 25
  - 32
  - 16
34. If A and B are disjoint sets, then  $|A \cup B|$  is:
- $|A| + |B|$
  - $|A| - |B|$
  - C.0
  - $|A| * |B|$
35. A set containing exactly one element is called a:
- Null Set
  - Singleton Set
  - Universal Set
  - Proper Set
36. If  $A = \{1, 2\}$  and  $B = \{a, b\}$  then the element  $(2, a)$  belongs to:
- $A \cup B$
  - $B * A$
  - $A * B$
  - $A \cap B$
37. The set of all subsets of a set S is called the:
- Universal Set
  - Solution Set
  - Power Set
  - Disjoint Set
38. The Symmetric Difference of two sets A and B, denoted  $A \Delta B$ , is defined as:
- $(A \cup B) \cap (A \cap B)$
  - $(A - B) \cup (B - A)$
  - $A \cap B$
  - $A \cup B$
39. If  $|A| = 10$ ,  $|B| = 15$ , and  $|A \cap B| = 5$ , find  $|A \cup B|$ .
- 25
  - 20
  - 30
  - 15
40. Which of the following sets is a finite set?
- $\{x \in \mathbb{Z}; x < 5\}$
  - $\{x \in \mathbb{R}; 0 < x < 1\}$
  - $\{x; x \text{ is a month of a year}\}$
  - $\{x; x \text{ is a prime number}\}$

41. If A is a subset of B ( $A \subseteq B$ ), which of the following must be true?
- $A \cap B = A$
  - $A \cup B = A$
  - $A \cap B = B$
  - $A - B = B$
42. The Principle of Inclusion-Exclusion for two finite sets A and B states that  $|A \cup B|$  equals:
- $|A| + |B|$
  - $|A| + |B| + |A \cap B|$
  - $|A| + |B| - |A \cap B|$
  - $|A| * |B|$
43. Let  $U = \{1, 2, 3, \dots, 10\}$  be the Universal Set and  $A = \{x \in U; x \text{ is even}\}$ . Find the  $U \setminus A$ :
- $\{2, 4, 6, 8, 10\}$
  - $\{1, 3, 5, 7, 9\}$
  - $\{1, 2, 3, 4, 5\}$
  - $\emptyset$
44. For any two sets A and B, the set difference  $A - B$  is equivalent to:
- $A \cap B'$
  - $A' \cap B$
  - $A \cup B'$
  - $(A \cup B)'$
45. If  $A = \{x, y\}$  and  $B = \{1, 2, 3\}$ , what is the cardinality of the Cartesian product  $A * B$ .
- 5
  - 6
  - 8
  - 9
46. Which of the following is a characteristic of an infinite set?
- Its elements can be counted and the process ends.
  - It is always a subset of a finite set.
  - It cannot be placed in a one-to-one correspondence with a proper subset of itself.
  - The number of elements in the set is not a natural number.
47. Given  $A = \{1, 2, 3, 4, 5\}$  and  $B = \{4, 5, 6, 7\}$ , determine the intersection  $A \cap B$ .
- $\{1, 2, 3, 4, 5, 6, 7\}$
  - $\{1, 2, 3\}$
  - $\{4, 5\}$
  - $\{16, 7\}$
48. Two sets A and B are defined as equal if and only if:
- $|A| = |B|$
  - $A \subseteq B$  and  $B \subseteq A$
  - $A \cap B = \phi$
  - $A \cap B = U$
49. A set that contains all possible elements under consideration for a specific mathematical discussion is known as the:
- Subset
  - Power Set
  - Universal Set
  - Finite Set
50. If a set A has n elements, what is the cardinality of its Power Set  $P(A)$ ?
- $n^2$
  - $2^n$
  - $2n$
  - $n!$

51. The double integral  $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$  is easier to solve using :
- (A) Cartesian Coordinates  
(B) Polar Coordinates  
(C) Integration by parts  
(D) Partial Fractions
52. If we change  $x=u+v$  and  $y=u-v$ , the Jacobian J is:
- (A) 2  
(B) -2  
(C) 1  
(D) 0
53. The region of integration for  $\int_0^1 \int_0^{\sqrt{1-x^2}} xf(x,y) dy dx$  is a :
- (A) Circle  
(B) Quadrant of a circle  
(C) Semicircle  
(D) Square
54. Evaluate  $\int_0^2 \int_0^y x dx dy$  :
- (A) 4/3  
(B) 2/3  
(C) 2  
(D) 4
55. The volume of a sphere of radius a can be found using the triple integral of 1 with limits in spherical coordinates. In Cartesian coordinates, the volume of a cube with side a is:
- (A)  $\int_0^a \int_0^a \int_0^a dx dy dz$   
(B)  $a^2$   
(C)  $a^4$   
(D)  $3a$
56. For a double integral  $\int_a^b \int_c^d f(x)g(y) dy dx$ , if the limits are constants, it can be written as:
- (A)  $\int_a^b f(x) dx \int_c^d g(y) dy$   
(B)  $\int_a^b f(x) dx + \int_c^d g(y) dy$   
(C)  $\int_a^b f(x)g(y) dx$   
(D) It cannot be simplified
57. Evaluate  $\int_0^1 \int_1^{1-x} dy dx$  :
- (A) 1  
(B) -0.5  
(C) 0.25  
(D) 2

58. A triple integral  $\iiint V \, dV$  represents the:
- (A) Mass of the solid  
(B) Surface area of the solid  
(C) Volume of the solid  
(D) Density of the solid
59. The value of  $\int_0^2 \int_1^2 xy^2 \, dy \, dx$  is:
- (A)  $14/3$   
(B)  $7/3$   
(C)  $2$   
(D)  $4$
60. To find the area of a circle  $x^2 + y^2 = a^2$  using double integration in polar coordinates, the limits for  $r$  and  $\theta$  are:
- (A)  $r: 0 \text{ to } a, \theta: 0 \text{ to } \pi$   
(B)  $r: 0 \text{ to } a, \theta: 0 \text{ to } 2\pi$   
(C)  $r: -a \text{ to } a, \theta: 0 \text{ to } 2\pi$   
(D)  $r: 0 \text{ to } a^2, \theta: 0 \text{ to } 2\pi$
61. The Jacobian  $J = \frac{\partial(x,y)}{\partial(r,\theta)}$  for the transformation  $x = r \cos \theta, y = r \sin \theta$  is:
- (A)  $1$   
(B)  $r$   
(C)  $r^2$   
(D)  $r \cos \theta$
62. Evaluate the double integral  $\int_0^1 \int_0^x x + y \, dx \, dy$ .
- (A)  $1/2$   
(B)  $1/3$   
(C)  $1/4$   
(D)  $2/3$
63.  $\int_0^1 x(1-x)^9 \, dx$ :
- (A)  $1/110$   
(B)  $1/132$   
(C)  $1/148$   
(D)  $1/140$
64. Evaluate  $\int_0^1 \int_0^1 \int_0^1 dx \, dy \, dz$ .
- (A)  $3$   
(B)  $1$   
(C)  $0$   
(D)  $0.5$

65. The volume of a solid bounded by a surface  $z=f(x,y)$  over a region  $R$  is:
- (A)  $\int_R f(x,y) dx dy$
- (B)  $\int_R dx dy$
- (C)  $\int_R \int_R \int_R dz dy dx$
- (D) Both (A) and (C) are valid
66. Evaluate the integral  $\int_0^\pi \int_0^a r dr d\theta$ :
- (A)  $\pi a^2$
- (B)  $\frac{\pi a^2}{2}$
- (C)  $\frac{2}{\pi} a$
- (D)  $\pi a$
67. When changing the order of integration for  $\int_0^1 \int_0^x f(x,y) dx dy$ , the new limits for  $x$  are:
- (A) 0 to 1
- (B)  $y$  to 1
- (C) 0 to  $y$
- (D)  $y$  to  $x$
68. In polar coordinates, the area element  $dA=dx dy$  is transformed into:
- (A)  $dr d\theta$
- (B)  $r dr d\theta$
- (C)  $r^2 dr d\theta$
- (D)  $r \sin \theta dr d\theta$
69. The area of a region  $R$  in the  $xy$ -plane is given by:
- (A)  $\int_R dx dy$
- (B)  $\int_R xy dx dy$
- (C)  $\int_R (x+y) dx dy$
- (D)  $\int_R xy dx/dy$
70. Evaluate the double integral  $\int_0^1 \int_0^2 dx dy$ :
- (A) 1
- (B) 2
- (C) 3
- (D) 0.5
71. For  $z = \tan^{-1} \frac{y}{x}$ , find  $\frac{\partial z}{\partial x}$ .
- (A)  $\frac{1}{x^2 + y^2}$
- (B)  $\frac{-y}{x^2 + y^2}$
- (C)  $\frac{x}{x^2 + y^2}$
- (D)  $\frac{-x}{x^2 + y^2}$

72. The condition for the function  $f(x,y)$

to be stationary at  $(a,b)$  is:

(A)  $\frac{\partial f}{\partial x}(a,b) = 0, \frac{\partial f}{\partial y}(a,b) = 0$

(B)  $\frac{\partial^2 f}{\partial x^2} > 0$

(C)  $\frac{\partial^2 f}{\partial x \partial y} = \frac{\partial^2 f}{\partial y \partial x}$

(D)  $f(a,b)=0$

73. If  $u=x^y$ , then  $\frac{\partial u}{\partial y}$  is:

(A)  $y x^{y-1}$

(B)  $x^y \log x$

(C)  $x^y$

(D)  $y \log x$

74. If  $x=r \cos \theta$  and  $y=r \sin \theta$ , then  $\frac{\partial r}{\partial x}$

is:

(A)  $\cos \theta$

(B)  $\sin \theta$

(C) 1

(D)  $\frac{x}{r}$

75. If  $(x,y)=x^4+y^4$ , the point  $(0,0)$  results

in  $rt-s^2=0$ . This test is:

(A) Indicative of a maximum

(B) Indicative of a minimum

(C) Inconclusive

(D) Indicative of a saddle point

76. A point where  $\frac{\partial f}{\partial x} = 0$  and  $\frac{\partial f}{\partial y} = 0$

but the function has neither a maximum nor a minimum is a:

(A) Extreme point

(B) Saddle point

(C) Node

(D) Boundary point

77. The function  $f(x,y) = \frac{x}{y}$  is homoge-

neous of degree:

(A) 1

(B) -1

(C) 0

(D) Infinite

78. If  $f(x,y)=e^{xy}$ , find  $\frac{\partial f}{\partial y}$ .

(A)  $e^{xy}$

(B)  $y e^{xy}$

(C)  $x e^{xy}$

(D)  $xy e^{xy}$

79. The total differential  $df$  for a function of two variables  $f(x,y)$  is defined as:

(A)  $\frac{\partial f}{\partial x} dx + \frac{\partial f}{\partial y} dy$

(B)  $\frac{\partial f}{\partial x} + \frac{\partial f}{\partial y}$

(C)  $\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2}$

(D)  $\frac{\partial f}{\partial x} dy + \frac{\partial f}{\partial y} dx$

80. For the function  $u = \log(x^2 + y^2)$ , calculate the value of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ .

(A)  $u$

(B)  $2$

(C)  $1$

(D)  $2u$

81. If  $u = f(x,y)$  is a homogeneous function of degree  $n$ , then

$x^2 \frac{\partial^2 f}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$  is:

(A)  $n(n-1)u$

(B)  $nu$

(C)  $(n-1)u$

(D)  $n^2u$

82. Find the degree of the homogeneous function  $f(x,y) = \sqrt{x^2 + y^2}$ :

(A)  $2$

(B)  $0$

(C)  $1$

(D)  $0.5$

83. The Chain Rule for  $z = f(x,y)$  where  $x = g(t)$  and  $y = h(t)$  is given by  $\frac{dz}{dt}$ :

(A)  $\frac{\partial z}{\partial x} \frac{dx}{dt} + \frac{\partial z}{\partial y} \frac{dy}{dt}$

(B)  $\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y}$

(C)  $\frac{\partial z}{\partial x} \frac{dy}{dt}$

(D)  $\frac{dx}{dt} \frac{dy}{dt}$

84. If  $rt - s^2 < 0$  at a critical point, the point is classified as a:

(A) Local Minimum

(B) Local Maximum

(C) Saddle Point

(D) Stationary Point

85. Let  $r = \frac{\partial^2 f}{\partial x^2}$ ,  $s = \frac{\partial^2 f}{\partial x \partial y}$ ,  $t = \frac{\partial^2 f}{\partial y^2}$ . At a critical point, if  $rt - s^2 > 0$  and  $r > 0$ , the function has a:

(A) Local Maximum

(B) Local Minimum

(C) Saddle Point

(D) Point of Inflection

86. To find the critical points of  $f(x,y)$  we must solve the system of equations:

(A)  $\frac{\partial f}{\partial x} = 0$  and  $\frac{\partial f}{\partial y} = 0$

(B)  $\frac{\partial f}{\partial x} = \frac{\partial f}{\partial y}$

(C)  $\frac{\partial^2 f}{\partial x^2} = 0$

(D)  $\frac{\partial^2 f}{\partial x \partial y} = 0$

87. A function  $f(x,y)$  is homogeneous of degree  $n$  if  $f(tx,ty) = t^n f(x,y)$ . What the degree is of  $f(x,y) = \frac{x^3 + y^3}{x-y}$ .

(A) 3

(B) 2

(C) 1

(D) 4

88. According to Euler's Theorem, if  $f(x,y)$  is a homogeneous function of degree  $n$ , then  $x \frac{\partial f}{\partial x} + y \frac{\partial f}{\partial y}$  equals:

(A)  $f(x,y)$

(B)  $n^2 f(x,y)$

(C)  $nf(x,y)$

(D) 0

89. For  $f(x,y) = \sin(x+y)$ , the second-order partial derivative  $\frac{\partial^2 f}{\partial x \partial y}$  is:

(A)  $\cos(x+y)$

(B)  $-\sin(x+y)$

(C)  $-\cos(x+y)$

(D)  $\sin(x+y)$

90. If  $f(x,y) = x^2y + 5y^3$ , find the partial derivative  $\frac{\partial f}{\partial x}$ :

(A)  $2xy$

(B)  $x^2 + 15y^2$

(C)  $2xy + 15y^2$

(D)  $2x$

91. In the lattice of divisors of 12, the value of  $4 \vee 6$  is

(A) 2

(B) 12

(C) 24

(D) 6

92. In the lattice of divisors of 12, the value of  $4 \wedge 6$  is:

(A) 12

(B) 2

(C) 1

(D) 24

93. In a Hasse diagram, an edge from  $x$  to  $y$  (where  $y$  is above  $x$ ) implies:

(A)  $y$  covers  $x$

(B)  $x$  covers  $y$

(C)  $x=y$

(D)  $x$  and  $y$  are incomparable

94. If every element of a distributive lattice has a complement, the lattice is called a:
- (A) Bounded Lattice
  - (B) Boolean Lattice
  - (C) Modular Lattice
  - (D) Sub lattice
95. The Principle of Duality in lattices allows us to swap
- (A)  $\vee$  with  $\wedge$  and  $\leq$  with  $\geq$
  - (B)  $a$  with  $b$
  - (C)  $1$  with  $x$
  - (D) Elements with subsets
96. A lattice is "Distributed" (Distributive) if it satisfies:
- (A) The cancellation law
  - (B) The distributive law of meet over join
  - (C) Both (A) and (B)
  - (D) Neither (A) nor (B)
97. In the Hasse diagram of divisors of 12, the element 1 is:
- (A) The maximal element
  - (B) The minimal element
  - (C) Incomparable to 12
  - (D) A join of 4 and 6
98. A lattice is a POSET in which every pair of elements has:
- (A) A unique GLB and a unique LUB
  - (B) Only a GLB
  - (C) Only a LUB
  - (D) A total ordering
99. In a bounded lattice, the symbol 0 represents the:
- (A) Greatest element
  - (B) Least element
  - (C) Identity element for meet
  - (D) Universal set
100. Which property is NOT required for a relation to be a partial order?
- (A) Reflexivity
  - (B) Symmetry
  - (C) Antisymmetric
  - (D) Transitivity