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

Question Booklet Number

O.M.R. Serial No. :

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## BCA II Semester (NEP Back Paper)

Examination, 2025-26

Mathematics-II

Paper Code						
B	C	A	2	0	0	5

Question Booklet Series

A

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)

**Rough Work**  
रफ़ कार्य

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

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

21. 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)  $R = \emptyset$
22. 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
23. For a function  $f: A \rightarrow B$ , the set A is known as the:
- (A) Codomain
  - (B) Range
  - (C) Domain
  - (D) Image
24. 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.
25. 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)  $A = B$ .
26. If a function is both injective and surjective, it is called:
- (A) Into
  - (B) Bijective
  - (C) Constant
  - (D) Identity
27. 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)  $\frac{2x}{1-x}$
28. 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)  $4x^2+1$
29. 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)  $R = a*b$
30. 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)  $(0, \infty)$

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

41. 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
42. 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
43. 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
44. 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)  $a \vee 1 = 1$
45. 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.
46. A subset of a POSET where every two elements are comparable is called a:  
 (A) Anti-chain  
 (B) Chain  
 (C) Lattice  
 (D) Sub-lattice
47. 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.
48. 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)  $a \vee b = a \wedge b$
49. 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)  $a = b'$
50. 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

51. Which property is NOT required for a relation to be a partial order?
- (A) Reflexivity
  - (B) Symmetry
  - (C) Antisymmetric
  - (D) Transitivity
52. In a bounded lattice, the symbol 0 represents the:
- (A) Greatest element
  - (B) Least element
  - (C) Identity element for meet
  - (D) Universal set
53. 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
54. 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
55. 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)
56. 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
57. 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

58. In a Hasse diagram, an edge from  $x$  to  $y$  (where  $y$  is above  $x$ ) implies:
- $y$  covers  $x$
  - $x$  covers  $y$
  - $x=y$
  - $x$  and  $y$  are incomparable
59. In the lattice of divisors of 12, the value of  $4 \wedge 6$  is:
- 12
  - 2
  - 1
  - 24
60. In the lattice of divisors of 12, the value of  $4 \vee 6$  is:
- 2
  - 12
  - 24
  - 6
61. If  $f(x,y)=x^2y+5y^3$ , find the partial derivative  $\frac{\partial f}{\partial x}$ :
- $2xy$
  - $x^2+15y^2$
  - $2xy+15y^2$
  - $2x$
62. For  $f(x,y)=\sin(x+y)$ , the second-order partial derivative  $\frac{\partial^2 f}{\partial x \partial y}$  is:
- $\cos(x+y)$
  - $-\sin(x+y)$
  - $-\cos(x+y)$
  - $\sin(x+y)$
63. 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:
- $f(x,y)$
  - $n^2 f(x,y)$
  - $nf(x,y)$
  - 0
64. A function  $f(x,y)$  is homogeneous of degree  $n$  if  $f(tx,ty)=t^n f(x,y)$ . What the degree is of  $f(x,y) = \frac{x^3 + y^3}{x-y}$ .
- 3
  - 2
  - 1
  - 4
65. To find the critical points of  $f(x,y)$  we must solve the system of equations:
- $\frac{\partial f}{\partial x} = 0$  and  $\frac{\partial f}{\partial y} = 0$
  - $\frac{\partial f}{\partial x} = \frac{\partial f}{\partial y}$
  - $\frac{\partial^2 f}{\partial x^2} = 0$
  - $\frac{\partial^2 f}{\partial x \partial y} = 0$

66. 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

67. 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

68. 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)  $\frac{dx}{dt} \frac{dy}{dt}$

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

- (A) 2
- (B) 0
- (C) 1
- (D) 0.5

70. 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)  $n^2u$

71. 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)  $2u$

72. 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)  $\frac{\partial f}{\partial x} dy + \frac{\partial f}{\partial y} dx$

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

- (A)  $e^{xy}$
- (B)  $y e^{xy}$
- (C)  $x e^{xy}$
- (D)  $xy e^{xy}$

74. The function  $f(x,y) = \frac{x}{y}$  is homogeneous of degree:

- (A) 1
- (B) -1
- (C) 0
- (D) Infinite

75. 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

76. 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

77. 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)  $\frac{x}{r}$

78. 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)  $y \log x$

79. 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)  $f(a,b)=0$

80. 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)  $\frac{-x}{x^2 + y^2}$

81. Evaluate the double integral

$$\int_0^1 \int_0^2 dx dy :$$

- (A) 1
- (B) 2
- (C) 3
- (D) 0.5

82. 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)  $\int_R xy dx/dy$

83. 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)  $r \sin \theta dr d\theta$

84. 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

85. 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)  $\pi a$

86. 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

87. Evaluate  $\int_0^1 \int_0^1 \int_0^1 dx dy dz$ .

- (A) 3
- (B) 1
- (C) 0
- (D) 0.5

88.  $\int_0^1 x(1-x)^9 dx$ :

- (A) 1/110
- (B) 1/132
- (C) 1/148
- (D) 1/140

89. 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

90. 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)  $r \cos \theta$

91. 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 to a,  $\theta$ ; 0 to  $\pi$
- (B) r: 0 to a,  $\theta$ ; 0 to  $2\pi$
- (C) r: -a to a,  $\theta$ ; 0 to  $2\pi$
- (D) r: 0 to  $a^2$ ,  $\theta$ ; 0 to  $2\pi$

92. The value of  $\int_0^2 \int_1^2 xy^2 dy dx$  is:

- (A) 14/3
- (B) 7/3
- (C) 2
- (D) 4

93. A triple integral  $\int \int \int V dV$  represents the:

- (A) Mass of the solid
- (B) Surface area of the solid
- (C) Volume of the solid
- (D) Density of the solid

94. Evaluate  $\int_0^1 \int_1^{1-x} dy dx$  :

- (A) 1
- (B) -0.5
- (C) 0.25
- (D) 2

95. For a double integral

$$\int_a^b \int_c^d f(x)g(y)dydx,$$
 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

96. 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)  $3a$

97. Evaluate  $\int_0^2 \int_0^y x dx dy$  :

- (A) 4/3
- (B) 2/3
- (C) 2
- (D) 4

98. 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

99. If we change  $x=u+v$  and  $y=u-v$ , the

Jacobian J is:

- (A) 2
- (B) -2
- (C) 1
- (D) 0

100. 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

**Rough Work**  
रफ़ कार्य

**Example :**

Question :

- Q. 1    (A)    (B)    (C)    (D)
- Q. 2    (A)    (B)    (C)    (D)
- Q. 3    (A)    (B)    (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 valid.
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 prohibited.
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

**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)    (B)    (C)    (D)
- प्रश्न 2    (A)    (B)    (C)    (D)
- प्रश्न 3    (A)    (B)    (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।