

Roll No. ....

Question Booklet Number

O. M. R. Serial No.

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396094

## B. C. A. (Second Semester) EXAMINATION, 2022-23

### MATHEMATICS-II

Paper Code						
B	C	A	2	0	0	5

Questions Booklet  
Series

B

Time : 1:30 Hours ]

[ Maximum Marks : 75

#### Instructions to the Examinee :

#### परीक्षार्थियों के लिए निर्देश :

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.
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 आन्तर-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 आन्तर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(Remaining Instructions on the last page)

(शेष निर्देश अन्तिम पृष्ठ पर)

***(Only for Rough Work)***

1. If  $f(x) = x^2 + 2, x \in \mathbb{R}$ , then the range of  $f(x)$  is :
  - (A)  $[2, \infty)$
  - (B)  $(-\infty, 2]$
  - (C)  $(-\infty, 2) \cup (2, \infty)$
  - (D)  $(-2, 2)$
2. If  $f(x) = ax + b$ , where  $a$  and  $b$  are integers,  $f(-1) = -5$  and  $f(3) = 3$ , then  $a$  and  $b$  are equal to :
  - (A)  $a = -3, b = 1$
  - (B)  $a = 0, b = 2$
  - (C)  $a = 2, b = -3$
  - (D) None of the above
3. Let  $A = \{1, 2, 3, 4\}$ ,  $R = \{(2, 2), (3, 3), (4, 4), (1, 2)\}$  is a relation on  $A$ . Then  $R$  is :
  - (A) transitive relation
  - (B) symmetric relation
  - (C) equivalence relation
  - (D) None of the above
4. Let  $A = \{1, 2, 3\}$ . Which of the following is not an equivalence relation on  $A$  ?
  - (A)  $\{(1, 1), (2, 2), (3, 3)\}$
  - (B)  $\{(1, 1), (2, 2), (3, 3), (1, 2), (2, 1)\}$
  - (C)  $\{(1, 1), (2, 2), (3, 3), (2, 3), (3, 2)\}$
  - (D) None of the above
5. A relation  $R$  is said to be an equivalence relation, if :
  - (A) It is reflexive.
  - (B) It is symmetric.
  - (C) It is transitive.
  - (D) All of the above
6. If  $S$  is relation from a non-empty set  $A$  to a non-empty set  $B$ , then :
  - (A)  $S = A \cap B$
  - (B)  $S = A \cup B$
  - (C)  $S \subseteq A \times B$
  - (D) None of the above
7. A relation  $R$  is reflexive, if for all  $a, b, c \in A$  :
  - (A)  $aRa$
  - (B)  $aRc$
  - (C)  $aRb$
  - (D) None of the above
8. If  $f : \mathbb{Z} \rightarrow \mathbb{Z}$  (set of integers) be defined by  $f(x) = x^2 + n - 1$ , then  $f(f(-1))$  is :
  - (A)  $-2$
  - (B)  $1$
  - (C)  $-1$
  - (D)  $3$

9. If function  $f : Q \rightarrow Q$  is defined by the relation  $f(x) = 3x + 1$ ,  $x \in Q$ , where  $Q$ , set of rational numbers, then  $f$  is :

- (A) Many one-onto mapping
- (B) One-one-into mapping
- (C) Many one-into mapping
- (D) One-one-onto mapping

10. A relation  $R$  on a set  $A$  is symmetric, if and only if :

- (A)  $R^{-1} \subset R$
- (B)  $R \subset R^{-1}$
- (C)  $R = R^{-1}$
- (D) None of the above

11. If  $f$  is a function defined from  $R$  to  $R$ , is given by  $f(x) = 3x - 5$ , then  $f^{-1}(x)$  is given by :

- (A)  $\frac{1}{3x-5}$
- (B)  $3x-5$
- (C)  $\frac{x+5}{3}$
- (D) None of the above

12. The relation  $\{(a, a), (a, b)\}$  on the set  $\{a, b, c\}$  is :

- (A) reflexive and transitive
- (B) reflexive and symmetric
- (C) transitive
- (D) reflexive

13. If  $A = \{a, b, c\}$ , which of the following relations of  $A$  is reflexive ?

- (A)  $\{(a, a), (c, c), (a, b)\}$
- (B)  $\{(a, a), (a, b), (b, c), (b, b), (c, c)\}$
- (C)  $\{(b, b), (c, c), (c, b)\}$
- (D) None of the above

14. Let  $R = \{(a, b) : a, b \in Z \text{ and } (a + b) \text{ is even}\}$ , then  $R$  is :

- (A) Reflexive relation on  $Z$
- (B) Equivalence relation on  $Z$
- (C) Transitive relation on  $Z$
- (D) None of the above

15. If  $y = f(x) = \left(\frac{3x+1}{5x-3}\right)$ , then  $f(y) =$

- (A)  $x^2$
- (B) 0
- (C)  $x$
- (D) None of the above

16. If  $R$  is an equivalence relation on a set  $A$ , then  $R^{-1}$  is :

- (A) Reflexive only
- (B) Symmetric only
- (C) Transitive only
- (D) Equivalence

17. If  $f : \mathbb{R} \rightarrow \mathbb{R}$  and  $g : \mathbb{R} \rightarrow \mathbb{R}$  are two mappings, where  $f(x) = 2x + 1$  and

$g(x) = x^2 + 2$ , then the value of  $f(g(2))$  will be :

- (A) 5
- (B) 13
- (C) 7
- (D) 10

18. If  $f(x) = x^2$  and  $g(x) = e^x$ , then the value of  $g \circ f(x)$  is :

- (A)  $e^{x^2}$
- (B)  $e^{2x}$
- (C)  $-e^{x^2}$
- (D)  $-e^{2x}$

19. Which laws are satisfied for a lattice ?

- (A) Associative law
- (B) Commutative law
- (C) Absorption law
- (D) All of the above

20. Least element if exists in a poset, will be :

- (A) unique
- (B) not unique
- (C) does not exist
- (D) None of the above

21. The dual of the statement :

$$(b \vee c) \wedge (c \vee a)$$

- (A)  $(b \wedge c) \wedge (c \wedge a)$
- (B)  $(b \vee c) \vee (c \vee a)$
- (C)  $(b \wedge c) \vee (c \wedge a)$
- (D)  $(b \vee c) \wedge (c \vee a)$

22. A self-complemented, distributive lattice is called :

- (A) Boolean Algebra
- (B) Modular Lattice
- (C) Complete Lattice
- (D) None of the above

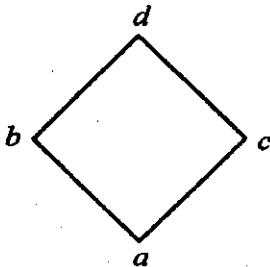
23.  $a \vee (b \wedge c) = (a \vee b) \wedge (a \vee c)$  is :

- (A) Associative law
- (B) Distributive law
- (C) Commutative law
- (D) None of the above

24.  $a \vee b = b \vee a$  and  $a \wedge b = b \wedge a$  is :

- (A) Distributive law
- (B) Associative law
- (C) Commutative law
- (D) None of the above

25. Which element is 'Maximal' in the following diagram ?



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

26. What are the two binary operations defined for lattice ?

- (A) Union, intersection
- (B) Join, meet
- (C) Addition, Subtraction
- (D) None of the above

27. Let  $D_{30} = \{1, 2, 3, 5, 6, 10, 15, 30\}$  and relation " $a$  divides  $b$ " be a partial ordering on  $D_{30}$ . The all lower bounds of 10 and 15 respectively are :

- (A) 1, 3
- (B) 1, 5
- (C) 1, 3, 5
- (D) None of the above

28. A finite lattice has :

- (A) Least element
- (B) Greatest element
- (C) Both (A) and (B)
- (D) None of the above

29. If  $f : A \rightarrow B$  is one-one and onto, then

$f^{-1} : B \rightarrow A$  is :

- (A) One-one
- (B) Onto
- (C) Both (A) and (B)
- (D) None of the above

30. The set  $N$  of natural numbers under the usual  $\leq$  satisfies which of the following properties ?

- (A) Reflexive
- (B) Anti-symmetric
- (C) Transitive
- (D) All of the above

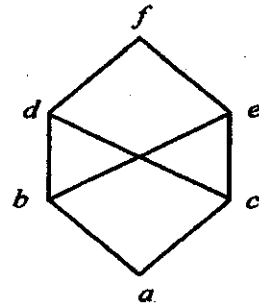
31. Which of the following relations is a partial order as well as an equivalence relation ?

- (A) Equal to ( $=$ )
- (B) Less than ( $<$ )
- (C) Greater than ( $>$ )
- (D) None of the above

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

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

33. The graph given below is an example of:



- (A) Lattice
- (B) Non-lattice
- (C) Semi-lattice
- (D) None of the above

34. Let  $P$  be a poset. If there exists an element  $b \in P$  such that  $b \leq x$  for all  $x \in P$ , then  $b$  is called ..... of  $P$ .

- (A) Least element
- (B) Greatest element
- (C) Unfy element
- (D) Maximal element

35. The set of natural numbers under divisibility forms .....

- (A) Non-poset
- (B) Poset
- (C) Both (A) and (B)
- (D) None of the above

36. Let  $A = \{-2, -1, 0\}$  and  $f(x) = 2x - 1$ , then the range of  $f$  is :

- (A)  $\{5, -3, -1\}$
- (B)  $\{-5, 3, -1\}$
- (C)  $\{-5, -3, -1\}$
- (D) None of the above

37. The degree of homogeneous function

$f(x, y) = x^3 + y^3 + 3xy^2$  is :

- (A) 0
- (B) -2
- (C) 2
- (D) 3

38. If  $u = xy \tan^{-1}\left(\frac{x}{y}\right)$ , then  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$  is equal to :

- (A)  $2u$
- (B) 0
- (C)  $u$
- (D)  $3u$

39. If  $u = \sin^{-1}\left(\frac{y}{x}\right)$ , then the value of

$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$  is :

- (A)  $u$
- (B)  $\tan u$
- (C)  $\sec^2 u$
- (D) 0

40. If  $f(x, y)$  is a homogeneous function of

$x$  and  $y$  of degree  $n$ , then  $x \frac{\partial f}{\partial x} + y \frac{\partial f}{\partial y} =$

- (A) 0
- (B)  $n$
- (C)  $nf(x, y)$
- (D)  $f(x, y)$

41. If  $u = 3x^2yz + 2yz^3 + 6x^4$ , then

$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}$  is equal to :

- (A)  $u$
- (B)  $3u$
- (C)  $4u$
- (D)  $2u$

42. If  $u = x^2 + y^2$ , then  $\frac{\partial u}{\partial x}$  at  $(2, 1)$  is :

- (A) 3
- (B) 2
- (C) 5
- (D) 4

43. If  $u = \log(x + y)$ , then  $\frac{\partial u}{\partial y}$  at  $(2, 1)$  is :

- (A)  $\frac{1}{3}$
- (B)  $\frac{1}{2}$
- (C)  $\frac{1}{4}$
- (D) None of the above



44. If  $f(x, y, z) = x^2 + xyz + z$ , find  $\frac{\partial f}{\partial x}$  at  $(1, 1, 1)$  is :  
 (A) 0  
 (B) 1  
 (C) 3  
 (D) None of the above
45. If  $f(x, y) = \frac{x+y}{x}$ , then  
 $x \frac{\partial f}{\partial x} + y \frac{\partial f}{\partial y} =$   
 (A) 0  
 (B)  $f$   
 (C)  $2f$   
 (D)  $3f$
46. Which of the following is true ?  
 (A)  $\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial y^2}$   
 (B)  $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$   
 (C)  $\frac{\partial u}{\partial x} = \frac{\partial u}{\partial y}$   
 (D) None of the above
47. If  $u$  is homogeneous function of degree 7,  
 then  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$   
 (A) 74  
 (B) 7  
 (C) 4  
 (D) None of the above
48. .... is applicable only for homogeneous function.  
 (A) Euler's theorem  
 (B) Rolle's theorem  
 (C) Lagrange's mean value theorem  
 (D) None of the above
49. If  $u = \sin^{-1} \left( \frac{x^2 + y^2}{x + y} \right)$ , then the value  
 of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$   
 (A)  $\sin u$   
 (B)  $\tan u$   
 (C)  $\cos u$   
 (D) None of the above
50. If  $u = \tan^{-1} \left( \frac{x^3 + y^3}{x + y} \right)$ , then the value  
 of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$   
 (A)  $\sin u$   
 (B)  $\sin 2u$   
 (C)  $\cos u$   
 (D)  $\tan u$
51. If  $u = \frac{x+y}{\sqrt{x} + \sqrt{y}}$  is a homogeneous  
 function of degree :  
 (A) 1  
 (B) 0  
 (C) 2  
 (D)  $\frac{1}{2}$

52. If  $u(x, y, z) = xy + yz + zx$ , then

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} \text{ is :}$$

- (A)  $x + y$
- (B)  $x + y + z$
- (C)  $2(xy + yz + zx)$
- (D)  $xy + yz + zx$

53. If  $u = x + y + z$ , then  $\frac{\partial u}{\partial z}$  at  $(1, 1, 1)$  is :

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

54. Function  $f(x, y)$  has minimum value at  $(a, b)$  is :

- (A)  $rt - s^2 > 0$  and  $r < 0$
- (B)  $rt - s^2 > 0$  and  $r > 0$
- (C)  $rt - s^2 < 0$  and  $r < 0$
- (D)  $rt - s^2 < 0$  and  $r > 0$

55. Maximum value of  $xe^{-x}$  is :

- (A)  $e$
- (B)  $\frac{1}{e}$
- (C)  $-e$
- (D)  $-\frac{1}{e}$

56. If  $f(x, y) = x^2 + y^2 + 3$ , then  $f$  has extreme value at :

- (A)  $(0, 0)$
- (B)  $(1, 0)$
- (C)  $(0, 1)$
- (D) None of the above

57. If  $f(x, y) = x^3 + y^3 - 3x - 12y + 20$ , then  $f$  has extreme value at :

- (A)  $(1, 1)$
- (B)  $(0, 0)$
- (C)  $(1, 2)$
- (D) None of the above

58. For function  $f(x, y)$  to have no extremum value at  $(a, b)$  is :

- (A)  $rt - s^2 > 0$
- (B)  $rt - s^2 < 0$
- (C) Both (A) and (B)
- (D) None of the above

59. What is Saddle point ?

- (A) Point where function has minimum value.
- (B) Point where function has maximum value.
- (C) Point where function have neither maximum nor minimum value.
- (D) None of the above

60. The value of  $\int_0^1 \int_0^1 xy \, dx \, dy =$

(A) 0

(B) 1

(C)  $\frac{1}{2}$

(D)  $\frac{1}{4}$

61.  $\int_0^1 \int_0^1 e^{x+y} \, dx \, dy =$

(A)  $(e - 1)$

(B)  $(e - 1)^2$

(C)  $(e - 1)^3$

(D) 0

62. The value of  $\int_0^2 \int_0^2 \int_0^2 dx \, dy \, dz$  is :

(A) 2

(B) 6

(C) 0

(D) 8

63.  $\int_0^1 \int_0^y dx \, dy$  is :

(A) 1

(B)  $\frac{1}{2}$

(C) 2

(D) 3

64. The change of order of integration

$$\int_0^1 \int_0^x dx \, dy :$$

(A)  $\int_0^1 \int_y^1 dy \, dx$

(B)  $\int_0^1 \int_0^y dy \, dx$

(C)  $\int_0^1 \int_0^x dy \, dx$

(D)  $\int_0^1 \int_0^1 dy \, dx$

65. The value of  $\int_0^\pi \int_0^1 r \, dr \, d\theta =$

(A)  $\frac{\pi}{2}$

(B)  $\pi$

(C) 1

(D)  $\frac{1}{2}$

66.  $\int_0^{\frac{\pi}{2}} \int_0^{\frac{\pi}{2}} d\theta \, d\phi$  is :

(A)  $\frac{\pi^2}{4}$

(B)  $\pi^2$

(C) 0

(D) None of the above

67. Double integral is used to calculate :

(A) Volume

(B) Area

(C) Both Volume and Area

(D) None of the above

68. What is the volume of a cube with side  $a$ ?

- (A)  $\int_0^a \int_0^a \int_0^a dx dy dz$
- (B)  $\int_0^a \int_0^a dx dy$
- (C)  $a^2$
- (D) 0

69. The area between the parabolas  $y^2 = 4x$  and  $x^2 = 4y$  is:

- (A)  $\frac{2}{3}$
- (B)  $\frac{14}{3}$
- (C)  $\frac{16}{3}$
- (D) None of the above

70. The value of  $\int_1^3 \int_1^4 dx dy =$

- (A) 3
- (B) 6
- (C) 12
- (D) 4

71.  $\int_0^1 \int_0^1 x^2 dx dy =$

- (A) 3
- (B) 0
- (C) 1
- (D)  $\frac{1}{3}$

72. The value of  $\int_0^1 \int_0^x dx dy$  is:

- (A)  $-\frac{3}{2}$
- (B)  $\frac{1}{2}$
- (C)  $\frac{3}{2}$
- (D)  $-\frac{1}{2}$

73. The value of  $\int_0^2 \int_0^y xy dx dy$  is:

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

74. The value of  $\int_{-1}^1 \int_{-1}^1 \int_{-1}^1 xyz dx dy dz =$

- (A) 1
- (B)  $\frac{1}{8}$
- (C) 0
- (D)  $-\frac{1}{8}$

75.  $\int_0^1 \int_0^2 \int_0^3 dx dy dz =$

- (A) 12
- (B) 3
- (C) 0
- (D) 6

76. The area enclosed between the straight line  $y = x$  and parabola  $y = x^2$  in the  $xy$ -plane is:

- (A) 0
- (B)  $\frac{1}{4}$
- (C)  $\frac{1}{3}$
- (D) None of the above

77. If  $A$ ,  $B$  and  $C$  are any three sets, then  $A \times (B \cup C)$  is equal to :
- (A)  $(A \times B) \cup (A \times C)$   
 (B)  $(A \cup B) \times (A \cup C)$   
 (C)  $(A \times B) \cap (A \times C)$   
 (D) None of the above
78. If  $A = \{5, 6, 7\}$  and  $B = \{7, 8, 9\}$ , then  $A \cup B$  is equal to :
- (A)  $\{5, 6, 7\}$   
 (B)  $\{5, 6, 7, 8, 9\}$   
 (C)  $\{7, 8, 9\}$   
 (D)  $\{7\}$
79. If  $R = \{(2, 1), (3, 3), (4, 5)\}$ , then range of the function is :
- (A) Range  $R = \{2, 4\}$   
 (B) Range  $R = \{1, 3, 5\}$   
 (C) Range  $R = \{2, 3, 4, 5\}$   
 (D) Range  $R = \{1, 4, 5\}$
80.  $(A')' =$
- (A)  $U - A$   
 (B)  $A'$   
 (C)  $U$   
 (D)  $A$
81. 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)  $A = B = C$   
 (C)  $B = C$   
 (D)  $A = B$
82. Empty set is a/an :
- (A) Finite set  
 (B) Invalid set  
 (C) Infinite set  
 (D) None of the above
83. The numbers of elements in the power set  $P(S)$  of the set  $S = \{1, 2, 3\}$  is :
- (A) 4  
 (B) 8  
 (C) 2  
 (D) None of the above
84. The cardinality of the set  $A = \{1, 3, 5\}$  is:
- (A) 3  
 (B) 5  
 (C) Integers  
 (D) None of the above

85. If  $n(A) = 20$  and  $n(B) = 30$  and  $n(A \cup B) = 40$ , then  $n(A \cap B) =$

- (A) 20
- (B) 30
- (C) 40
- (D) 10

86. Difference of  $\{1, 2, 3, 6, 8\}$  and  $\{1, 2, 5, 6\}$  is the set :

- (A)  $\{1, 3\}$
- (B)  $\{5, 6, 8\}$
- (C)  $\{3, 8\}$
- (D) None of the above

87. If A and B are non-empty sets, then  $A \cap B :$

- (A)  $x \in A$  or  $x \in B$
- (B)  $x \in A$  or  $x \notin B$
- (C)  $x \in A$  and  $x \in B$
- (D) All of the above

88. Two sets are said to be disjoint when :

- (A)  $A \cup B = \phi$
- (B)  $A \cap B = \phi$
- (C)  $A \cap B \neq \phi$
- (D)  $A \cup B \neq \phi$

89. If  $n(A) = 27$ ,  $n(B) = 35$  and  $n(A \cap B) = 12$ , then :

- (A)  $n(A \cup B) = 50$
- (B)  $n(A - B) = 50$
- (C)  $n(A \cup B)' = 50$
- (D) None of the above

90. What is de Morgan's law ?

- (A)  $(A \cup B)' = A' \cap B'$
- (B)  $(A \cap B)' = A' \cup B'$
- (C) Both (A) and (B)
- (D) None of the above

91. If A has  $m$  elements and B has  $n$  elements, then :

- (A)  $n(A \times B) = m \cdot m$
- (B)  $n(A \times B) = m \cdot n$
- (C)  $n(A \times B) = n \cdot n$
- (D) None of the above

92. If every element of a set A is also an element of set B, then :

- (A)  $A \cap B = \phi$
- (B)  $A = B$
- (C)  $B \subseteq A$
- (D)  $A \subseteq B$

93. If  $A = \{a\}$  and  $B = \{2\}$ , then  $A \times B =$

- (A)  $\{(2, a)\}$
- (B)  $\{(a, 2)\}$
- (C)  $\{0\}$
- (D) None of the above

94. Which of the following two sets are equal ?

- (A)  $X = \{5, 6\}$  and  $Y = \{6\}$
- (B)  $X = \{5, 6, 9\}$  and  $Y = \{5, 6\}$
- (C)  $X = \{5, 6, 8, 9\}$  and  $Y = \{6, 8, 5, 9\}$
- (D)  $X = \{5, 6\}$  and  $Y = \{5, 6, 3\}$

95.  $A - (B \cup C)$  is :

- (A)  $(A - B) \cup (A - C)$
- (B)  $(A - B) \cup C$
- (C)  $(A - B) \cap C$
- (D)  $(A - B) \cap (A - C)$

96. In a college, there are 25 teachers who teach Computers or Mathematics. Of these, 15 teach Computers and 6 teach both Computers and Mathematics. How many teach Mathematics ?

- (A) 15
- (B) 16
- (C) 10
- (D) None of the above

97. Let  $f : A \rightarrow B$  and  $g : B \rightarrow C$  by the one-one-onto functions. Then  $(g \circ f)^{-1}$  is :

- (A)  $f^{-1} \circ g^{-1}$
- (B)  $f \circ g$
- (C)  $g^{-1} \circ f^{-1}$
- (D)  $g \circ f$

98. Let  $f, g : \mathbb{R} \rightarrow \mathbb{R}$  be defined by  $f(x) = 3x + 1$  and  $g(x) = x^2 - 2$ ,  $\forall x \in \mathbb{R}$  respectively. Then  $f \circ g$  is :

- (A)  $9x^2 + 6x - 1$
- (B)  $3x^2$
- (C)  $3x^2 - 5$
- (D) None of the above

99. Let  $f : \mathbb{R} \rightarrow \mathbb{R}$  be defined by  $f(x) = \frac{1}{x} \forall x \in \mathbb{R}$ . Then  $f$  is :

- (A) One-one
- (B) Onto
- (C) Both (A) and (B)
- (D)  $f$  is not defined

100. If  $f(x) = x^3 - \frac{1}{x^3}$ , then  $f(x) + f\left(\frac{1}{x}\right)$  is equal to :

- (A)  $2x^3$
- (B)  $\frac{2}{x^3}$
- (C) 0
- (D) None of the above

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 :

**Example :**

**Question :**

Q.1 (A) ● (C) (D)

Q.2 (A) (B) ● (D)

Q.3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.

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 and 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.

**Imppt. :** 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.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर—A, B, C एवं D हैं। परीक्षार्थी को उन चार विकल्पों में से सही उत्तर छँटना है। उत्तर को OMR आन्तर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

**उदाहरण :**

**प्रश्न :**

प्रश्न 1 (A) ● (C) (D)

प्रश्न 2 (A) (B) ● (D)

प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

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 को 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 के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।

11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, 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 :** प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कनिष्ठ निरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।