

Chapter 7 - Set, Relations and Functions

Sets

Past Year Questions

PYQ May 18

- (1) The numbers of proper subset of the set $\{3, 4, 5, 6, 7\}$ is
- | | |
|-------|-------|
| a. 32 | b. 31 |
| c. 30 | d. 25 |

PYQ Nov. 18

- (2) If $A = \{1, 2, 3, 4, 5, 6, 7\}$ and $B = \{2, 4, 6, 8\}$. Cardinal number of $A - B$ is:
- | | |
|------|------|
| a. 4 | b. 3 |
| c. 9 | d. 7 |

PYQ June 19

- (3) If $A = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$
 $B = \{1, 3, 4, 5, 7, 8\}$
 $C = \{2, 6, 8\}$ then find $(A - B) \cup C$
- | | |
|---------------------|------------------|
| a. $\{2, 6\}$ | b. $\{2, 6, 8\}$ |
| c. $\{2, 6, 8, 9\}$ | d. None of these |

PYQ June 19

- (4) The no. of subsets of the set $\{3, 4, 5\}$ is:
- | | |
|-------|-------|
| a. 4 | b. 8 |
| c. 16 | d. 32 |

PYQ Nov. 19

- (5) $(A^T)^T = ?$
- | | |
|--------------------|-------------|
| a. A | b. A^T |
| c. $A^T \cdot A^T$ | d. A^{2T} |

Note: This que is from matrix (deleted topic).

PYQ Nov. 20

- (6) Two finite sets respectively have x and y number of elements. The total number of subsets of the first is 56 more than the total number of subsets of the second. The value of x and y respectively.
- | | |
|------------|------------|
| a. 6 and 3 | b. 4 and 2 |
| c. 2 and 4 | d. 3 and 6 |

PYQ Nov. 20

- (7) The set of cubes of the natural number is:
- | |
|----------------------------------|
| a. A null set |
| b. A finite set |
| c. An infinite set |
| d. A finite set of three numbers |

PYQ Nov 20, PYQ Jan 21

- (8) The set of cubes of natural number is
- | |
|--------------------|
| a. Null set |
| b. A finite set |
| c. An infinite set |
| d. Singleton set |

PYQ Jan. 21

- (9) The number of integers from 1 to 100 which are neither divisible by 3 nor by 5 nor by 7 is
- | | |
|-------|-------|
| a. 67 | b. 55 |
| c. 45 | d. 33 |

PYQ July 21

- (10) Let U be the universal set, A and B are the subsets of U . If $n(U) = 650$, $n(A) = 310$, $n(A \cap B) = 95$ and $n(B) = 190$, then $n(\overline{A \cap B})$ is equal to (\overline{A} and \overline{B} are the complement of A and B respectively):
- | | |
|--------|--------|
| a. 400 | b. 200 |
| c. 300 | d. 245 |

PYQ Nov 20, PYQ June 22

- (11) Two finite sets have x and y number of elements. The total number of subsets of first is 56 more than the total number of subsets of second. The value of x and y is:
- | | |
|------------|------------|
| a. 6 and 3 | b. 4 and 2 |
| c. 2 and 4 | d. 3 and 4 |

PYQ June 22

- (12) Given $A = \{2, 3\}$, $B = \{4, 5\}$, $C = \{5, 6\}$ then $A \times (B \cap C)$ is
- | | |
|-----------------------|-----------------------|
| a. $\{(2,5), (3,5)\}$ | b. $\{(5,2), (5,3)\}$ |
| c. $\{(2,3), (5,5)\}$ | d. None of these |

PYQ June 22

- (13) If the universal set $E = \{x : x \text{ is a positive integer } < 25\}$, $A = \{2, 6, 8, 14, 22\}$, $B = \{4, 8, 10, 14\}$
- | |
|-------------------------------|
| a. $(A \cap B)' = A' \cup B'$ |
| b. $(A \cap B)' = A' \cap B'$ |
| c. $(A' \cap B') = \phi$ |
| d. None of these |

PYQ May 18

- (14) In a town of ₹ 20,000 families it was found that 40% families buy newspaper A, 20% families buy newspaper B and 10% families buy newspaper C, 5% families buy A and B, 3% buy B and C and 4% buy A and C, if 2% families buy all the three newspaper, then the number of families which buy A only is:
- | | |
|---------|---------|
| a. 6600 | b. 6300 |
| c. 5600 | d. 600 |

PYQ Nov. 20

- (15) The number of items in the set A is 40; in the set B is 32; in the set C is 50; in both A and B is 4, in both A and C is 5; in both B and C 7 in all the sets 2. How many are in at least one of the set?
- a. 110 b. 65
c. 108 d. 84

PYQ Dec. 21

- (16) Out of a group of 20 teachers in a school, 10 teach Mathematics, 9 teach Physics and 7 teach Chemistry. 4 teach Mathematics and Physics but none teach both Mathematics and Chemistry. How many teach Chemistry and Physics; how many teach only Physics?
- a. 2, 3 b. 3, 2
c. 4, 6 d. 6, 4

PYQ Dec. 22

- (17) If $A = \{1, 2, 3, 4, 5, 7, 8, 9\}$ and $B = \{2, 4, 6, 7, 9\}$ then how many proper subset of $A \cap B$ can be created?
- a. 16 b. 15
c. 32 d. 31

PYQ Dec. 22

- (18) The number of subsets of the set $\{0, 1, 2, 3\}$ is:
- a. 2 b. 4
c. 8 d. 16

PYQ Jun 23

- (19) A survey shows that 74% of the Canadian like grapes, whereas 68% like bananas. What percentage of the Canadians like both grapes and bananas, if everybody likes either of two?
- a. 32% b. 26%
c. 6% d. 42%

PYQ Jun 23

- (20) If $A = \{a, b, c\}$, $B = \{b, c, d\}$ and $C = \{a, d, c\}$ then $(A - B) \times (B \cap C)$ is equal to:
- a. $\{(a, d), (c, d)\}$ b. $\{(a, c), (a, d)\}$
c. $\{(c, a), (d, a)\}$ d. $\{(a, c), (a, d), (b, d)\}$

PYQ Dec 23

- (21) In a survey of 100 boys it was found that 50 used white shirts, 40 red shirts and 30 blue shirts. 20 were habituated in using both white and red shirts. 15 were using both red and blue shirts and 10 were using blue and white shirts. Find the number of boys who are using all colours.
- a. 20 b. 25
c. 30 d. 35

PYQ Dec 23

- (22) If $A = \{2, 4\}$ and $B = \{1, 2, 3\}$ then $(A \cup B) \times (A \cap B)$ is equal to:
- a. $\{(1, 2), (2, 2), (3, 2)\}$
b. $\{(1, 2), (2, 2), (2, 3), (2, 4)\}$
c. $\{(2, 1), (2, 2), (2, 4)\}$
d. $\{(1, 2), (2, 2), (3, 2), (4, 2)\}$

PYQ Dec 23

- (23) If $B = \{1, 2, 3, 4, 5\}$, then the number of proper subsets of B is
- a. 120 b. 30
c. 31 d. 32

PYQ Dec 23

- (24) If $A = \{1, 2\}$, $B = \{3, 4\}$, $C = \{5, 6\}$ then the value of $A \times (B \cup C)$
- a. $\{(1, 2), (3, 4), (5, 6)\}$
b. $\{(1, 3), (2, 3), (1, 4), (2, 4), (2, 5), (1, 5), (1, 6), (2, 6)\}$
c. $\{(1, 3), (2, 3), (1, 4), (2, 4), (2, 5), (1, 5)\}$
d. $\{(3, 1), (2, 3), (4, 1), (2, 4), (2, 5), (1, 5), (1, 6), (2, 6)\}$

PYQ Sep 23

- (25) If a set contain n elements, then the total number of proper subsets of set is:
- a. $2^n - 1$ b. 2^n
c. 2^{n-1} d. $2^n - 2$

PYQ Sep 23

- (26) A town has a total population of 50,000. Of it 28,000 read the newspaper 'X' and 23,000 read newspaper 'Y', while 4,000 read both the newspaper. The number of persons not reading any of the two newspapers are:
- a. 3,000 b. 2,000
c. 2,500 d. 5,000

Answer Key

1	b	2	a	3	c
4	b	5	a	6	a
7	c	8	c	9	c
10	d	11	a	12	a
13	a	14	a	15	c
16	a	17	b	18	d
19	d	20	b	21	b
22	d	23	c	24	b
25	a	26	a		

Sets

Mock Test Paper Questions

MTP Nov 18

- (1) The number of proper subsets of the set $\{3, 4, 5, 6, 7\}$ is
- | | |
|-------|-------|
| a. 32 | b. 31 |
| c. 30 | d. 25 |

MTP Nov 18

- (2) If A and B are two sets $A = \{1, 2, 3, 4\}$ and $B = \{2, 3, 4\}$ then $(A - B) \cup (B - A)$
- | | |
|---------------|---------------------|
| a. $\{1\}$ | b. $\{1, 2, 3\}$ |
| c. $\{1, 3\}$ | d. $\{1, 2, 3, 4\}$ |

MTP Nov 18

- (3) The number of subsets $\{1, 2, 5\}$ is
- | | |
|------|------|
| a. 3 | b. 8 |
| c. 6 | d. 9 |

MTP May 19

- (4) If $A = \{1, 2, 3, 4, 5, 6, 7\}$ and $B = \{2, 4, 6\}$ Cardinal number of $A \cup B$
- | | |
|------|-------|
| a. 3 | b. 16 |
| c. 5 | d. 7 |

MTP May 19 Series II

- (5) If $A = \{1, 2, 3, 4\}$ and $B = \{5, 6, 7, 6\}$, then cardinal number of the set $A \times B$ is _____
- | | |
|-------|------------------|
| a. 7 | b. 1 |
| c. 16 | d. none of these |

MTP Nov 19

- (6) If $A = \{1, 2, 3, 4, 5\}$ and $B = \{6, 7, 8\}$, then cardinal number of $A \times B$ is:
- | | |
|-------|------|
| a. 15 | b. 5 |
| c. 3 | d. 8 |

MTP Nov 19

- (7) The number of subsets of the set $A = \{1, 2, 3, 4, 5, 6, 7, 8\}$ is
- | | |
|--------|------------------|
| a. 36 | b. 128 |
| c. 256 | d. None of these |

MTP May 20

- (8) $(A \cup B)'$ is equal to
- | | |
|-------------------|------------------|
| a. $(A' \cup B)'$ | b. $A' \cap B'$ |
| c. $A' \cup B'$ | d. none of these |

MTP Nov 20

- (9) If $A = \{p, q, r, s\}$, $B = \{q, s, t\}$ and $C = \{m, q, n\}$ find $C - (A \cap B)$
- | | |
|---------------|---------------|
| a. $\{m, n\}$ | b. $\{p, q\}$ |
| c. $\{r, s\}$ | d. $\{p, r\}$ |

MTP Nov 20

- (10) The set having no element is called
- Singleton set
 - Null set
 - Finite set
 - Infinite set

MTP March 21

- (11) If $A = \{1, 2, 3, 4, 5\}$ and $B = \{6, 7, 8, 9\}$, then cardinal number of $A \times B$ is:
- | | |
|-------|------|
| a. 20 | b. 5 |
| c. 3 | d. 8 |

MTP March 21

- (12) The number of subsets of the set $A = \{1, 2, 3, 4, 5, 6, 7, 8\}$ is
- | | |
|--------|------------------|
| a. 36 | b. 128 |
| c. 256 | d. None of these |

MTP March 21

- (13) If $A = \{1, 2, 3, 4, 5\}$, $B = \{2, 4\}$ and $C = \{1, 3, 5\}$ then $(A - C) \times B$ is
- $\{(2, 2), (2, 4), (4, 2), (4, 4), (5, 2), (5, 4)\}$
 - $\{(2, 2), (2, 4), (4, 2), (4, 4), (5, 2), (5, 4)\}$
 - $\{(2, 2), (4, 2), (4, 4), (4, 5)\}$
 - $\{(2, 2), (2, 4), (4, 2), (4, 4)\}$

MTP Nov 21

- (14) Let Z be the universal set for two sets A and B . If $n(A) = 300$, $n(B) = 400$ and $n(A \cap B) = 200$, then $n(A' \cap B')$ is equal to 400 provided $n(Z)$ is equal to
- | | |
|--------|--------|
| a. 900 | b. 800 |
| c. 700 | d. 600 |

MTP Nov 21

- (15) If $A = \{4, 5\}$, $B = \{2, 3\}$, $C = \{5, 6\}$ then $A \times (B \cap C)$
- | | |
|-------------------------|-------------------------|
| a. $\{(2, 5), (3, 5)\}$ | b. $\{(4, 2), (4, 6)\}$ |
| c. $\{(4, 3), (4, 2)\}$ | d. none of these |

MTP March 21

- (16) If $A = \{1, 2, 3\}$, $B = \{3, 4\}$ and $C = \{4, 5, 6\}$, then $A \times (B \cap C)$
- $\{(1, 4), (2, 4), (3, 4)\}$
 - $\{(1, 4), (2, 4), (3, 4)\}$
 - $\{(3, 4), (2, 4)\}$
 - $\{(1, 2), (1, 4), (1, 6), (3, 4)\}$

MTP Dec 22 - Series I

- (17) Two finite sets have m and n elements. The total number of subsets of first set is 56 more than the total number of subsets of the second set. The value of m and n are
- | | |
|---------|---------|
| a. 6, 3 | b. 7, 6 |
| c. 5, 1 | d. 8, 7 |

MTP Dec 22 Series II

- (18) The number of proper subset of the set $\{3, 4, 5, 6, 7\}$ is
- | | |
|-------|-------|
| a. 32 | b. 31 |
| c. 30 | d. 25 |

MTP Dec 22 Series II

- (19) Let A be the set of squares of natural numbers and let $x \in A, y \in A$, then
- | | |
|------------------------|----------------|
| a. $x+y \in A$ | b. $x-y \in A$ |
| c. $\frac{x}{y} \in A$ | d. $xy \in A$ |

MTP May 20

- (20) A town has a total population of 50,000. Out of it 28,000 read the newspaper X and 23,000 read Y while 4,000 read both the papers. The number of persons not reading X and Y both is
- | | |
|----------|------------------|
| a. 2,000 | b. 3,000 |
| c. 2,500 | d. none of these |

MTP Apr 21/ MTP Sep 24 I

- (21) In a survey of 300 companies, the number of companies using different Media-Newspapers (N), Radio (R) and Television (T) are as follows: $n(N) = 200, n(R) = 100, n(T) = 40, n(N \cap R) = 50, n(R \cap T) = 20, n(N \cap R) = 25$, and $n(N \cap R \cap T) = 5$, Find the numbers of companies using none of these media:
- | | |
|-----------------|------------------|
| a. 20 companies | b. 250 companies |
| c. 30 companies | d. 50 companies |

MTP Nov 21

- (22) In a group of students 80 can speak Hindi, 60 can speak English and 40 can speak Hindi and English both, then number of students is:
- | | |
|--------|--------|
| a. 100 | b. 140 |
| c. 180 | d. 60 |

MTP Dec 22 Series II

- (23) Out of total 150 students, 45 passed in Accounts, 30 in Economics and 50 in Maths, 30 in both Accounts and Maths, 32 in both Maths and Economics, 35 in both Accounts and Economics, 25 students passed in all the three subjects. Find the numbers who passed at least in any one of the subjects:
- | | |
|-------|------------------|
| a. 63 | b. 53 |
| c. 73 | d. none of these |

MTP June 2023 Series I

- (24) If $A = \{0, 1, 2, 3, 4, 5\}$ then the no. of subsets of A
- | | |
|-------|-------|
| a. 64 | b. 63 |
| c. 61 | d. 60 |

MTP June 2023 Series I

- (25) The number of proper subsets of $A \cap B$, if $A = \{1, 2, 3, 4, 5, 7, 8, 9, 10\}$ and $B = \{2, 4, 6, 7, 9\}$
- | | |
|-------|-------|
| a. 8 | b. 15 |
| c. 16 | d. 64 |

MTP June 2023 Series II

- (26) Out of 20 members in a family, 11 like to take tea and 14 like coffee. Assume that each one likes at least one of the two drinks. Find how many like both coffee and tea:
- | | |
|------|------|
| a. 2 | b. 3 |
| c. 4 | d. 5 |

MTP Dec 2023 Series I

- (27) In a survey of 300 companies, the number of companies using different media-Newspapers (N), Radio (R) and Television (T) are as follows: $n(N) = 200, n(R) = 100, n(T) = 40, n(N \cap R) = 50, n(R \cap T) = 20, n(N \cap R) = 25$, and $n(N \cap R \cap T) = 5$, Find the numbers of companies using none of these media:
- | | |
|-----------------|------------------|
| a. 20 companies | b. 250 companies |
| c. 30 companies | d. 50 companies |

MTP Dec 2023 Series II

- (28) If $A = \{p, q, r, s\}, B = \{q, s, t\}, C = \{m, q, n\}$
Find $C - [A \cap B]$
- | | |
|---------------|---------------|
| a. $\{m, n\}$ | b. $\{p, q\}$ |
| c. $\{r, s\}$ | d. $\{p, r\}$ |

MTP Dec 2023 Series II

- (29) From a group of 200 persons, 100 are interested in music, 70 in photography and 40 in swimming, furthermore 40 are interested in both music and photography, 30 in both music and swimming, 20 in photography and swimming and 10 in all the three. How many are interested in photography but not in music and swimming?
- | | |
|-------|-------|
| a. 30 | b. 15 |
| c. 25 | d. 20 |

MTP June 24 Series I

- (30) If $A = \{1, 2, 3, 4, 5\}, B = \{2, 4\}$ and $C = \{1, 3, 5\}$ then $(A - C) \times B$ is:
- | |
|---|
| a. $\{(2, 2)(2, 4)(4, 2)(4, 4)(5, 2)(5, 4)\}$ |
| b. $\{(1, 2)(1, 4)(3, 2)(3, 4)(5, 2)(5, 4)\}$ |
| c. $\{(2, 2)(4, 2)(4, 4)(4, 5)\}$ |
| d. $\{(2, 2)(2, 4)(4, 2)(4, 4)\}$ |

PYQ June 24

- (8) Consider the following relations on $A = \{1, 2, 3\}$, $R = \{(1, 1), (1, 2), (1, 3), (3, 3)\}$, $S = \{(1, 1), (1, 2), (2, 1), (2, 2), (3, 3)\}$, $T = \{(1, 1), (1, 2), (2, 2), (2, 3)\}$ and $\Phi =$ empty set. Which one of these forms an equivalence relation?
- a. R b. S
c. T d. Φ

PYQ Sep 24

- (9) Let $A = \{1, 2, 3\}$ and consider the relation $R = \{(1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1, 3)\}$, then R is
- a. Reflexive but not symmetric
b. Reflexive but not transitive
c. Symmetric and Transitive
d. Neither symmetric nor transitive

Answer Key

1 b	2 a	3 c
4 d	5 c	6 b
7 a	8 b	9 a

Relations

Mock Test Paper Questions

MTP May 18

- (1) On the sets of lines in a plane the Relation "is perpendicular to" is
- a. Reflexive b. Symmetric
c. Transitive d. None of these

MTP Nov 18

- (2) On the set of lines, being perpendicular is a _____ relation.
- a. Reflexive
b. Symmetric
c. Transitive
d. None of these

MTP Dec 22 Series II

- (3) Let $A = \{1, 2, 3\}$, then the relation $R = \{(1, 1), (2, 3), (2, 2), (3, 3), (1, 2)\}$ is:
- a. Symmetric b. Transitive
c. Reflexive d. Equivalence

MTP Dec 22 Series II

- (4) Let $A = \{1, 2, 3\}$ then the relation $R = \{(1, 1), (2, 3), (2, 2), (3, 3), (1, 2)\}$ is called
- a. Symmetric b. Transitive
c. Reflexive d. Equivalence

MTP Dec 22 Series II

- (4) Let $A = \{1, 2, 3\}$ then the relation $R = \{(1, 1), (2, 3), (2, 2), (3, 3), (1, 2)\}$ is called
- a. Symmetric b. Transitive
c. Reflexive d. Equivalence

MTP June 24 Series I

- (5) On the set of lines, being perpendicular is a _____ satisfies which property:
- a. Reflexive b. Symmetric
c. Transitive d. None of these

MTP June 24 Series III

- (6) On the sets of lines in a plane the Relation "is perpendicular to" is
- a. Reflexive b. Symmetric
c. Transitive d. none of these

MTP Sep 24 Series I

- (7) $R = \{(1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1, 3)\}$ on the set $A = \{1, 2, 3\}$ is:
- a. reflexive but not symmetric
b. reflexive but not transitive
c. symmetric and transitive
d. neither symmetric nor transitive

Answer Key

1 b	2 b	3 c
4 c	5 b	6 b
7 a		

Functions

Past Year Questions

PYQ May 18

- (1) Let N be the set of all natural numbers; E be the set of all even natural numbers then the function $f : N \rightarrow E$ defined $f(x) = 2x, x \in N$
- a. One-One Into
b. Many-One Into
c. One-One Onto
d. Many-One Onto

PYQ Nov. 18

- (2) A is $\{1, 2, 3, 4\}$ and B is $\{1, 4, 9, 16, 25\}$ is a function f is defined from set A to B where $f(x) = x^2$ then the range of f is:
- a. $\{1, 2, 3, 4\}$ b. $\{1, 4, 9, 16\}$
c. $\{1, 4, 9, 16, 25\}$ d. None of these

PYQ Nov. 18

(3) Identify the function from the following:

- a. $\{(1,1), (1,2), (1,3)\}$
 b. $\{(1,1), (2,1), (2,3)\}$
 c. $\{(1,2), (2,2), (3,2), (4,2)\}$
 d. None of these

PYQ June 19

(4) If $f(x) = x^2$ and $g(x) = \sqrt{x}$ then

- a. $go f(3) = 3$ b. $go f(-3) = 9$
 c. $go f(9) = 3$ d. $go f(-9) = 3$

PYQ June 19

(5) If $A = (a, b, c, d)$; $B = (p, q, r, s)$ which of the following relation is a function from A to B

- ★
 a. $R_1 = \{(a,p), (b,q), (c,s)\}$
 b. $R_2 = \{(p,a), (b,r), (d,s)\}$
 c. $R_3 = \{(b,p), (c,s), (b,r)\}$
 d. $R_4 = \{(a,p), (b,r), (c,q), (d,s)\}$

PYQ Nov. 19

(6) $f(n) = f(n-1) + f(n-2)$ when $n = 2, 3, 4, \dots$
★ $f(0) = 0, f(1) = 1$ then $f(7) = ?$

- a. 3 b. 5
 c. 8 d. 13

PYQ Nov. 19

(7) $f(x) = \frac{x+1}{x}$ find $f^{-1}(x)$

- a. $1/(x-1)$ b. $1/(y-1)$
 c. $\frac{1}{y} - 1$ d. X

PYQ Nov. 20

(8) The inverse function f^{-1} of $f(y) = 3y$ is:

- a. $1/3y$ b. $y/3$
 c. $-3y$ d. $1/y$

PYQ Jan. 21

(9) Let $f: \mathbb{R} \Rightarrow \mathbb{R}$ be defined by

$$f(x) = \begin{cases} 2x & \text{for } x > 3 \\ x^2 & \text{for } 1 < x \leq 3 \\ 3x & \text{for } x \leq 1 \end{cases}$$

The value of $f(-1) + f(2) + f(4)$ is

- a. 9 b. 14
 c. 5 d. 6

PYQ July 21

(10) The range of the function f defined by

$$f(x) = \sqrt{16 - x^2}$$
 is

- a. $(-4, 0)$ b. $(-4, 4)$
 c. $[0, 4]$ d. $(+4, 4)$

PYQ July 21

(11) Let $A = \mathbb{R} - \{3\}$ and $B = \mathbb{R} - \{1\}$. Let $f(x) \rightarrow B$ ★ defined by $f(x) = \frac{x-2}{x-3}$. What is the value of

$$f^{-1}\left(\frac{1}{2}\right)?$$

- a. $2/3$ b. $3/4$
 c. 1 d. -1

PYQ July 21

(12) If $f(x) = x^2 - 1$ and $g(x) = |2x + 3|$, then★ $[fog(3) - gof(-3)]$ is?

- a. 71 b. 61
 c. 41 d. 51

PYQ Dec. 21

(13) If $u(x) = \frac{1}{1-x}$, then $u^{-1}(x)$ is:

- a. $\frac{1}{x-1}$ b. $1-x$
 c. $1 - \frac{1}{x}$ d. $\frac{1}{x} - 1$

PYQ June 22

(14) $f(x) = \{(2,2); (3,3); (4,4); (5,5); (6,6)\}$ be a relation of set $A = (2, 3, 4, 5, 6)$

- a. Reflexive and Transitive
 b. Reflexive and Symmetric
 c. Reflexive only
 d. An equivalence relation

PYQ June 22

(15) If $f(y) = \frac{y-1}{y}$, find $f^{-1}(x)$

- ★
 a. $\frac{1}{1-y}$ b. y
 c. $\frac{y}{y-1}$ d. $\frac{y}{1-y}$

PYQ Jun 23

(16) If $f(x): \mathbb{N} \rightarrow \mathbb{R}$ is a function defined as

$$f(x) = 4x + 3, \forall x \in \mathbb{N}, \text{ then } f^{-1}(x) \text{ is:}$$

- a. $4 + \frac{x+3}{4}$ b. $\frac{x+3}{4}$
 c. $\frac{x-3}{4}$ d. $\frac{3x+4}{4}$

PYQ Sep 24

(17) If $f(x) = x^2 + x - 1$ and $4f(x) = f(2x)$, then

- find the value of 'x'
 a. $2/3$ b. $3/2$
 c. $3/4$ d. $4/3$

Answer Key

1 c	2 b	3 c
4 a	5 d	6 d
7 a	8 b	9 a
10 c	11 c	12 b
13 c	14 c	15 a
16 c	17 b	

Functions

Mock Test Paper Questions

MTP May 18

- (1) Find
- $f \circ g$
- for the functions

$f(x) = x^8, g(x) = 2x^2 + 1$

- a. $x^8(2x^2 + 1)$ b. x^8
 c. $2x^2 + 1$ d. $(2x^2 + 1)^8$

PYQ Nov 18, MTP May 19

- (2) If
- $A = \{1, 2, 3, 4\}$
- and
- $B = \{1, 4, 9, 16, 25\}$
- is a function of
- f
- is defined set
- A
- to
- B
- where
- $f(x) = x^2$
- then the range of
- f
- is

- a. $\{1, 2, 3, 4\}$ b. $\{1, 4, 9, 16\}$
 c. $\{1, 4, 9, 16, 25\}$ d. none of these

MTP May 19

- (3) If
- $f(x) = x + 3$
- and
- $g(x) = x^2$
- , then
- $f \circ g(x)$

- a. $x^2 + 3$ b. $x^2 + x + 3$
 c. $(x + 3)^2$ d. None of these

MTP May 19 Series II

- (4) A function
- $f(x)$
- is an even function, if

- a. $-f(x) = f(x)$ b. $f(-x) = f(x)$
 c. $f(-x) = -f(x)$ d. None of these

MTP May 19 Series II

- (5) Find the
- $f \circ g$
- for the functions
- $f(x) = x^3, g(x) = x + 1$

- a. $x^2(x + 1)$ b. x^2
 c. $x + 1$ d. $(x + 1)^3$

MTP Nov 19

- (6) If
- $f(x) = \left(\frac{x^2 - 4}{x - 2}\right)$
- , then
- $f(2)$
- is.

- a. 0 b. 2
 c. 4 d. 1

Note: From Chp8 - Calculus

MTP Nov 19

- (7) If
- $f'(x) = 3x^2 + 2$
- &
- $f(0) = 0$
- then find
- $f(2)$
- .

- a. 8 b. 10
 c. 12 d. none of these

ICAI SM, MTP May 20

- (8) If
- $f(x) = \frac{x}{1-x}$
- &
- $g(x) = \frac{x-1}{x}$
- , then
- $g \circ f(x)$
- is

- a. $x - 1$ b. x
 c. $1/x$ d. none of these

MTP Nov 20

- (9) Let
- $f: \mathbb{R} \rightarrow \mathbb{R}$
- be such that
- $f(x) = 2^x$
- , then
- $f(x+y)$
- equals

- a. $f(x) + f(y)$
 b. $f(x) \cdot f(y)$
 c. $f(x) \cdot f(y)$
 d. None of these

MTP Nov 19, MTP March 21

- (10) If
- $f(x) = \left(\frac{x^2 - 4}{x - 2}\right)$
- , then
- $f(2)$
- is

- a. 0 b. 2
 c. 4 d. 1

MTP March 21

- (11) If
- $f(x) = x^3$
- and
- $f'(1) = 10$
- then the value of
- K
- is

- a. $10a$ b. -10
 c. $1/10$ d. None

Note: From Chapter 8

MTP Apr 21

- (12) Let
- \mathbb{R}
- is the set of real numbers such that the function
- $f: \mathbb{R} \rightarrow \mathbb{R}$
- and
- $g: \mathbb{R} \rightarrow \mathbb{R}$
- are defined by
- $f(x) = x^2 + 3x + 1$
- and
- $g(x) = 2x - 3$
- . Find
- $(f \circ g)$
- :

- a. $4x^2 + 6x + 1$ b. $x^2 + 6x + 1$
 c. $4x^2 - 6x + 1$ d. $x^2 - 6x + 1$

MTP Apr 21

- (13) If
- $A = \{1, 2, 3, 4\}$
- ,
- $B = \{2, 4, 6, 8\}$
- ,
- $f(1) = 2$
- ,
- $f(2) = 4$
- ,
- $f(3) = 6$
- &
- $f(4) = 8$
- , and
- $f: A \rightarrow B$
- then
- f^{-1}
- is:

- a. $\{(2, 1), (4, 2), (6, 3), (8, 4)\}$
 b. $\{(1, 2), (2, 4), (3, 6), (4, 8)\}$
 c. $\{(1, 4), (2, 2), (3, 6), (4, 8)\}$
 d. none of these

MTP Nov 21

- (14) If
- $f(x) = x^2 - 1$
- and
- $g(x) = 2x + 3$
- then
- $g \circ f(3)$

- a. 71 b. 61
 c. 41 d. 19

MTP Oct 21

- (15) Find
- $g \circ f$
- for the functions
- $f(x) = \sqrt{x}$
- ,
- $g(x) = 2x^2 + 1$
- .

- a. $2x^2 + 1$ b. $2x + 1$
 c. $(2x^2 + 1)(\sqrt{x})$ d. \sqrt{x}

(16) If $f(x) = x^2 - 1$ and $g(x) = \frac{x+1}{2}$, then

$$\frac{f(3)}{f(3)+g(3)} \text{ is}$$

- a. $\frac{5}{4}$ b. $\frac{4}{5}$
c. $\frac{3}{5}$ d. $\frac{5}{3}$

MTP March 22

(17) If $f(x) = \frac{2+x}{2-x}$, then $f^{-1}(x)$

- a. $\frac{2(x-1)}{x+1}$ b. $\frac{2(x+1)}{x-1}$
c. $\frac{(x+1)}{x-1}$ d. $\frac{(x-1)}{x+1}$

MTP March 22

(18) If $f: \mathbb{R} \rightarrow \mathbb{R}$ is a function, defined by $f(x) = 2^x$; then $f(x+y)$ is

- a. $f(x) + f(y)$ b. $f(x) \cdot f(y)$
c. $f(x) \div f(y)$ d. none

MTP March 22

(19) If $f(x) = x + 2$, $g(x) = 7^x$ then $g \circ f(x) =$ _____

- a. $7^x \cdot x + 2 \cdot 7^x$ b. $7^x + 2$
c. $49(7^x)$ d. none of these

MTP June 22

(20) Let R be a relation on \mathbb{N} defined by $x + 2y = 8$. The domain of R is:

- a. $\{2, 4, 8\}$ b. $\{2, 4, 6, 8\}$
c. $\{2, 4, 6\}$ d. $\{1, 2, 3, 4\}$

MTP June 22

(21) The domain of the function

$$f(x) = \frac{x^2 + 3x + 5}{x^2 - 5x + 4} \text{ is:}$$

- a. \mathbb{R} b. $\mathbb{R} - \{1, 4\}$
c. $\mathbb{R} - \{1\}$ d. $\{1, 4\}$

MTP Dec 22 - Series I

(22) $f(p) = \frac{1}{1-p}$, then f^{-1} is

- a. $1-p$ b. $(p-1)/p$
c. $p/(p-1)$ d. $1/p$

MTP Dec 22 - Series I

(23) Determine $f(x)$, given that $f'(x) = 12x^2 - 4x$ and $f(-3) = 17$

- a. $f(x) = 4x^3 - 2x^2 + 143$
b. $f(x) = 6x^3 - x^4 + 137$
c. $f(x) = 3x^4 - x^3 - 137$

d. $f(x) = 4x^3 - 2x^2 - 143$

MTP June 2023 Series I

(24) If $f(x) = x^2 - 5$, evaluate $f(3)$, $f(-4)$, $f(5)$, and $f(1)$.

- a. $0, 11, 20, 4$ b. $-4, 11, -2, 4$
c. $4, 11, 20, -4$ d. $-2, 0, 20, 5$

MTP June 2023 Series II

(25) If $f(x) = \frac{x}{\sqrt{1+x^2}}$ and $g(x) = \frac{x}{\sqrt{1-x^2}}$ Find $f \circ g$?

- a. x b. $1/x$
c. $x/\sqrt{1-x^2}$ d. $x\sqrt{1-x^2}$

MTP June 2023 Series II

(26) The range of the relation

$$\{(1,0)(2,0)(3,0)(4,0)(0,0)\} \text{ is}$$

- a. $\{1, 2, 3, 4, 0\}$ b. $\{0\}$
c. $\{1, 2, 3, 4\}$ d. None of these

MTP Dec 2023 Series I

(27) If $f(x) = x + 2$, $g(x) = 7^x$, then $g \circ f(x) =$

- a. $7^x \cdot x + 2 \cdot 7^x$ b. $7^x + 2$
c. $49(7^x)$ d. None of these

MTP Dec 2023 Series II

(28) If $f(x) = 2x + 2$ and $g(x) = x^2$, then the value of $f \circ g(4)$ is:

- a. 18 b. 22
c. 34 d. 128

MTP June 24 Series I

(29) Let R is the set of real numbers, such that the function $f: \mathbb{R} \rightarrow \mathbb{R}$ and $g: \mathbb{R} \rightarrow \mathbb{R}$ are defined by $f(x) = x^2 + 3x + 1$ and $g(x) = 2x - 3$. Find $(f \circ g)$:

- a. $4x^2 + 6x + 1$ b. $x^2 + 6x + 1$
c. $4x^2 - 6x + 1$ d. $x^2 - 6x + 1$

MTP June 24 Series II

(30) Let R is the set of real numbers such that the function $f: \mathbb{R} \rightarrow \mathbb{R}$ and $g: \mathbb{R} \rightarrow \mathbb{R}$ are defined by $f(x) = x^2 + 3x + 1$ and $g(x) = 2x - 3$ Find $(f \circ g)$:

- a. $4x^2 + 6x + 1$ b. $x^2 + 6x + 1$
c. $4x^2 - 6x + 1$ d. $x^2 - 6x + 1$

MTP June 24 Series II

(31) Given the function $f(x) = (2x + 3)$, then the value of $f(2x) - 2f(x) + 3$ will be:

- a. 3 b. 2
c. 1 d. 0

MTP June 24 Series III

(32) Find $f \circ g$ for the functions

$$f(x) = x^8, g(x) = 2x^2 + 1$$

- a. $x^8(2x^2 + 1)$ b. x^8
 c. $2x^2 + 1$ d. $(2x^2 + 1)^8$

MTP Sep 24 Series II / RTP Sep 24

(33) If $f(x) = x + 2, g(x) = 7^x$, then $g \circ f(x) =$

- ★ a. $7x \cdot x + 2 \cdot 7x$ b. $7x + 2$
 c. $49(7x)$ d. None of these

MTP Sep 24 Series II

(34) $X = \{x, y, z, w\}; Y = \{1, 2, 3, 4\};$

$$H = \{(x, 1); (y, 2); (y, 3); (z, 4); (x, 4)\}$$

- a. H is a function from x to y
 b. H is not a function from x to y
 c. H is a relation from y to x
 d. None of these

Answer Key

1 d	2 b	3 a
4 b	5 d	6 c
7 c	8 b	9 b
10 c	11 a	12 c
13 a	14 d	15 b
16 b	17 a	18 b
19 c	20 c	21 b
22 b	23 a	24 c
25 a	26 b	27 c
28 c	29 c	30 c
31 d	32 d	33 c
34 b		

Limits and Continuity

PYQ and MTP

PYQ June 24

(1) The $\lim_{x \rightarrow 2} \frac{x^2 - 4x + 4}{x - 2} =$ _____

- a. 0 b. 1
 c. 2 d. 0.5

MTP Sep 24 Series II

(2) What is the value of $\lim_{y \rightarrow 2} \frac{y^2 - 4}{y - 2}$

- a. 2 b. 4
 c. 1 d. 0

Answer Key

1 a 2 b