

Maxprap. Chapter wise Series Class 11th – Set Theory

Class : 11th

Subject: Mathematics

Max. Marks : 50

Duration : 2 Hrs

Sections: A (MCQs), B (Short Answer-I), C (Short Answer-II), D (Long Answer), E (Case-Based).

General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 23 questions divided into five Sections A, B, C, D and E. (iii). Section A comprises of 10 MCQs of 1 mark each. Section B comprises of 5 questions of 2 marks each. Section C comprises of 4 questions of 3 marks each. Section D comprises of 2 question of 5 marks each and Section E comprises of 2 Case Study Based Questions of 4 marks each.
- (iv). There is no overall choice.
- (v). Use of Calculators is not permitted.

Section A

Questions 1 to 10 carry 1 mark each

1. Let $A = \{1, 2, 3, 4\}$, $B = \{2, 3, 4, 5, 6\}$, then $(A \cap B)$ is equal to :
a) $\{1, 2, 3\}$ b) $\{2, 3, 4\}$ c) $\{5, 6\}$ d) $\{1\}$
2. Let S = set of points inside the square, T = the set of points inside the triangle and C = the set of points inside the circle. If the triangle and circle intersect each other and are contained in a square. Then
a) $S \cup T \cup C = S$ b) $S \cap T \cap C = \phi$
c) $S \cup T \cup C = C$ d) $S \cap T = S \cap C$
3. If A and B are two sets then $A \cap (A \cap B')$ = . . .
a) $\in$ b) ϕ c) B d) A
4. If $A \subseteq B$, then $A \cap B$ is equal to
a) B' b) B c) A' d) A
5. For two sets $A \cup B = A$ if
a) $B \subseteq A$ b) $A = B$ c) $A \subseteq B$ d) $A \neq B$
6. The Collection of intelligent students in a class is
a) a finite set b) a null set c) a singleton set d) not a Set
7. Which of the following is a null set?
a) $\{x : x^2 + 1 = 0, x \in \mathbb{R}\}$
b) $\{x : x > 0 \text{ or } x < 0\}$
c) $\{x : x^2 = 4 \text{ or } x = 3\}$
d) $\{0\}$
a) B b) A c) C d) D

8. If $A = \{x : x \text{ is a multiple of 3, } x \text{ natural no., } x < 30\}$ and $B = \{x : x \text{ is a multiple of 5, } x \text{ is natural no., } x < 30\}$ then $A - B$ is

- a) $\{3, 5, 6, 9, 10, 12, 15, 18, 20, 21, 25, 27, 30\}$ b) $\{3, 6, 9, 12, 18, 21, 24, 27, 30\}$
c) $\{3, 6, 9, 12, 18, 21, 24, 27\}$ d) $\{3, 6, 9, 12, 15, 18, 21, 24, 27, 30\}$

Assertion(A)/Reason(R) Based (9-10): In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

9. Assertion (A): if $A =$ set of letters in **Alloy** $B =$ set of letters in **LOYAL**, then set A & B are equal sets.

Reason (R): If two sets have exactly the same elements, they are called equal sets.

10. Assertion (A): Let $A = \{a, b\}$ and $B = \{a, b, c\}$. Then, $A \not\subset B$.

Reason (R): If $A \subset B$, then $A \cup B = B$.

SECTION – B

Questions 11 to 15 carry 2 marks each

11. Let $A = \{x : x \in \mathbb{N}\}$, $B = \{x : x = 2n, n \in \mathbb{N}\}$, $C = \{x : x = 2n - 1, n \in \mathbb{N}\}$ and, $D = \{x : x \text{ is a prime natural number}\}$. Find: $A \cap B$.

12. If $A = \{x : x \in \mathbb{N}, x \leq 7\}$, $B = \{x : x \text{ is prime, } x < 8\}$ and $C = \{x : x \in \mathbb{N}, x \text{ is odd and } x < 10\}$, verify that: $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.

13. From the sets given below, select equal sets:

$A = \{2, 4, 8, 12\}$, $B = \{1, 2, 3, 4\}$, $C = \{4, 8, 12, 14\}$, $D = \{3, 1, 4, 2\}$, $E = \{-1, 1\}$, $F = \{0, a\}$, $G = \{1, -1\}$, $H = \{0, 1\}$

14. If $A = \{a, b, c, d, e\}$, $B = \{a, c, e, g\}$ and $C = \{b, e, f, g\}$, verify that : $A - (B \cap C) = (A - B) - (A - C)$.

15. If $A = \{1, 3, 5, 7, 9\}$ and $B = \{2, 3, 5, 7, 11\}$, then find $A \Delta B$.

SECTION – C

Questions 16 to 19 carry 3 marks each

16. Which of the following sets are equal ?

- a) $A = \{1, 2, 3\}$
b) $B = \{x \in \mathbb{R} : x^2 - 2x + 1 = 0\}$
c) $C = \{1, 2, 2, 3\}$
d) $D = \{x \in \mathbb{R} : x^3 - 6x^2 + 11x - 6 = 0\}$

17. If $u = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 24\}$

$A = \{x : x \text{ is prime and } x \leq 10\}$ $B = \{x : x \text{ is a factor of } 24\}$

Verify the following result

- a) $A - B = A \cap B'$ b) $(A \cup B)' = A' \cap B'$ c) $(A \cap B)' = A' \cup B'$

18. In a class, 18 students took Physics, 23 students took Chemistry and 24 students took Mathematics of these 13 took both Chemistry and Mathematics, 12 took both Physics and Chemistry and 11 took both Physics and Mathematics. If 6 students offered all the three subjects, find:

- a) The total number of students.
b) How many took Maths but not Chemistry.
c) How many took exactly one of the three subjects.

19. There are 200 individuals with a skin disorder, 120 had been exposed to the chemical C_1 , 50 to chemical C_2 and 30 to both the chemicals C_1 and C_2 . Find the number of individuals exposed to (i) chemical C_1 but not chemical C_2 (ii) Chemical C_2 but not chemical C_1 (iii) Chemical C_2 or chemical C_1 .

SECTION – D

Questions 20 to 21 carry 5 marks each

20. If $A = \{4, 5, 6, 7, 8, 10\}$, $B = \{4, 5, 9\}$ and $C = \{1, 4, 6, 9\}$, then verify that

- a) $(A \cap B) \cap C = A \cap (B \cap C)$
b) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
c) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

21. If $U = \{a, b, c, d, e, f\}$, $A = \{a, b, c\}$, $B = \{c, d, e, f\}$, $C = \{c, d, e\}$ and $D = \{d, e, f\}$, then tabulate the following sets:

- (a) $A \cap D$ (b) $A \cap C$ (c) $U \cap D$
(d) $A \cup \phi$ (e) $(U \cap \phi)'$ (f) $(U \cup A)'$

SECTION – E (Case Study Based Questions)

Questions 22 & 23 carry 4 marks each

22. Read the following text carefully and answer the questions that follow:

In a library 25 students read physics, chemistry and mathematics books.



It was found that 15 students read mathematics, 12 students read physics while 11 students read chemistry. 5 students read both mathematics and chemistry, 9 students read physics and mathematics. 4 students read physics and chemistry and 3 students read all three subject books.

- Find the number of students who read none of the subject. (1)
- Find the number of students who read atleast one of the subject. (1)
- Find the number of students who read only one of the subjects. (2)

OR

Find the number of students who read only mathematics. (2)

23. Read the following text carefully and answer the questions that follow:

A class teacher Neha Sharma of class XI write three sets A, B and C are such that $A = \{1, 3, 5, 7, 9\}$, $B = \{2, 4, 6, 8\}$ and $C = \{2, 3, 5, 7, 11\}$.

- Write the intersecting of two set A and C? (1)
- Write the condition for two sets A and B to be disjoint? (1)
- Find $A \cap C$. (2)

OR

Find $A \cap B$. (2)

Set Theory Paper Details – Analysis		
Objective Questions		
MCQ	1 marks x 8 question = 8	
Assertion Reason	1 marks x 2 question = 2	
Subjective		
Short type I	2 marks x 5 question = 10	
Short type II	3 marks x 4 question = 12	
Long Type	5 marks x 2 question = 10	
Case Studies Based		
Case 1	4 marks	
Case 2	4 marks	

Total = 50 marks Your Score =