CLASS XI – MATHEMATICS (041)

CHAPTER 1 : SETS

PRACTICE PAPER (SESSION 2026–27)

Maximum Marks: 40 **Time Allowed: 1½ Hours**

General Instructions:

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 23 questions. All questions are compulsory.
2. This question paper is divided into five Sections – A, B, C, D and E.
3. In Section A, Questions 1 to 12 are Multiple Choice Questions (MCQs) and Questions 13 and 14 are Assertion–Reason based questions of 1 mark each.
4. In Section B, Questions 15 to 18 are Very Short Answer (VSA) type questions, carrying 2 marks each.
5. In Section C, Questions 19 to 21 are Short Answer (SA) type questions, carrying 3 marks each.
6. In Section D, Question 22 is a Long Answer (LA) type question, carrying 5 marks.
7. In Section E, Question 23 is a case study based question, carrying 4 marks.
8. There is no overall choice. However, an internal choice has been provided in 2 questions of Section B (Q17, Q18), 2 questions of Section C (Q20, Q21), in Q22 of Section D and in one sub-part of Q23 of Section E.
9. Draw neat and clean figures wherever required. Use of calculators is not allowed.

SECTION – A **(14 × 1 = 14)**

This section comprises of 12 multiple choice questions (Q1–Q12) and 2 assertion–reason based questions (Q13–Q14) of 1 mark each.

No.	Questions	Marks

Q1. The shaded region in the Venn diagram given below (Fig. 1) represents **1**

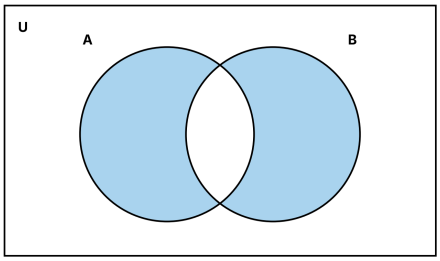


Fig. 1

(A) A ∩ B (B) (A ∪ B) − (A ∩ B)

(C) (A ∪ B)′ (D) A′ ∪ B′

Q2. The graph (Fig. 2) shows a set of real numbers on the number line. (A filled dot means that the point is included; an open dot means that the point is excluded.) The set shown is **1**

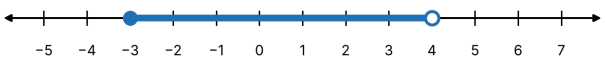


Fig. 2

(A) {x : x ∈ R, −3 ≤ x < 4} (B) {x : x ∈ R, −3 < x ≤ 4}

(C) {x : x ∈ R, −3 ≤ x ≤ 4} (D) {x : x ∈ R, −3 < x < 4}

Q3. The number of proper subsets of the set A = {x : x is a prime number less than 8} is **1**

(A) 16 (B) 14

(C) 15 (D) 8

Q4. The number of elements in the set $\{x : x \in Z \text{ and } -5 < 2x + 1 \leq 7\}$ is **1**

(A) 5 (B) 7

(C) 8 (D) 6

Q5. Which of the following is an empty set? **1**

(A) $\{x : x \in N \text{ and } 3 < x < 4\}$ (B) $\{x : x \in R \text{ and } x^2 = 4\}$

(C) $\{x : x \in Z \text{ and } |x| < 1\}$ (D) $\{x : x \in N \text{ and } x^2 = 16\}$

Q6. If $A \subset B$, then which of the following is **NOT** necessarily true? **1**

(A) $A \cup B = B$ (B) $A \cap B = A$

(C) $A - B = \varphi$ (D) $B - A = \varphi$

Q7. Let $U = \{x : x \in N, x \leq 12\}$, $A = \{x : x \text{ is a multiple of } 3\}$ and $B = \{x : x \text{ is an even number}\}$ be subsets of U. The number of elements in $A' \cap B$ is **1**

(A) 2 (B) 3

(C) 4 (D) 6

Q8. Study the Venn diagram (Fig. 3), in which $U = \{a, b, c, d, e, f, g, h, i, j\}$. The number of elements in $A \cup B'$ is **1**

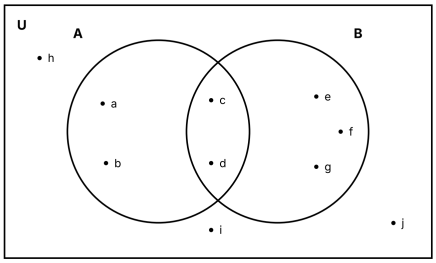


Fig. 3

(A) 5 (B) 7

(C) 6 (D) 8

Q9. Which of the following words has exactly the same set of letters as the word MISSISSIPPI? **1**

(A) IMPS (B) SIMPLE

(C) MISS (D) SIMPSON

Q10. Taking N as the universal set, the complement of $A = \{x : x \in N \text{ and } 2x + 1 > 9\}$ is **1**

(A) {1, 2, 3} (B) {1, 2, 3, 4, 5}

(C) {1, 2, 3, 4} (D) {5, 6, 7, . . .}

Q11. If $A = \{2, \{3\}, 4\}$, then which of the following statements is correct? **1**

(A) $\{3\} \subset A$ (B) $3 \in A$

(C) $\{2, 3\} \subset A$ (D) $\{3\} \in A$

Q12. If $A = [-3, 5)$ and $B = (1, 8]$, then $A - B$ is **1**

(A) $[-3, 1)$ (B) $[-3, 1]$

(C) $(-3, 1]$ (D) $(1, 5)$

Assertion–Reason Based Questions

Directions: Question numbers 13 and 14 are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer from the options (A), (B), (C) and (D) as given below:
(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true but Reason (R) is false.
(D) Assertion (A) is false but Reason (R) is true.

Q13. **Assertion (A):** The set $\{x : x \in N \text{ and } x < 1\}$ is the empty set. **1**
Reason (R): The set of natural numbers is an infinite set.

Q14. **Assertion (A):** For any two sets A and B, $A - B = B - A$. **1**
Reason (R): $A - B = \{x : x \in A \text{ and } x \notin B\}$.

SECTION – B (4 × 2 = 8)

This section comprises of 4 very short answer (VSA) type questions of 2 marks each.

Q15. In the Venn diagram (Fig. 4), U is the universal set. Write the following sets in roster form: **2**

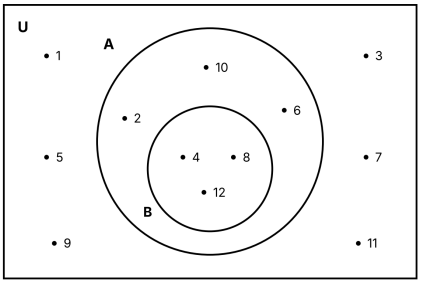


Fig. 4

(i) $A - B$ (ii) $(A \cup B)'$

Q16. Write the set $\{1/2, 2/5, 3/10, 4/17, 5/26\}$ in set-builder form. **2**

Q17. **(A)** Are the sets $X = \{x : x \in R \text{ and } x^2 - 5x + 6 = 0\}$ and $Y = \{y : y \in N \text{ and } 1 < y < 4\}$ equal? Justify your answer. **2**

OR

(B) List all the subsets of the set $A = \{a, \{b\}\}$.

Q18. **(A)** Let $A = \{x : x \in N, x \leq 8\}$, $B = \{x : x \text{ is an even natural number, } x \leq 12\}$ and $C = \{x : x \text{ is a multiple of 3, } x \in N, x \leq 12\}$. Find $A \cap (B \cup C)$ and $(A \cap B) \cup (A \cap C)$. What do you observe? **2**

OR

(B) If $A = (-4, 3]$ and $B = [-1, 6)$, find $A \cap B$ and $A \cup B$, writing your answers as intervals.

SECTION – C (3 × 3 = 9)

This section comprises of 3 short answer (SA) type questions of 3 marks each.

Q19. The Venn diagram (Fig. 5) shows three subsets A, B and C of a universal set U. The shaded region is the part of the diagram that lies in both A and B but not in C. **3**

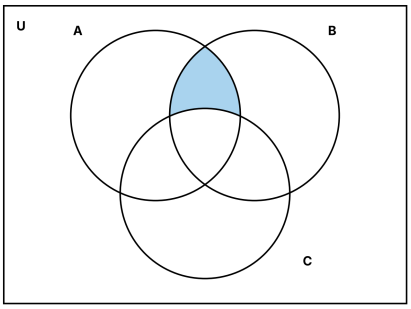


Fig. 5

(i) Express the shaded region using set operations. **[1]**

(ii) If A = {1, 2, 3, 4, 5, 6, 7}, B = {2, 4, 6, 7, 8} and C = {3, 4, 5, 6, 9}, find the set represented by the shaded region. **[2]**

Q20. **(A)** For any two sets A and B, prove that A − (A − B) = A ∩ B. **3**

OR

(B) If A ⊂ B, prove that A ∪ (B − A) = B.

Q21. **(A)** Let U = {1, 2, 3, . . . , 10}, A = {2, 3, 5, 7} and B = {1, 3, 5, 7, 9}. Verify both De Morgan's laws: (A ∪ B)′ = A′ ∩ B′ and (A ∩ B)′ = A′ ∪ B′. **3**

OR

(B) Let A = {x : x ∈ R, $x^2 - 7x + 10 = 0$}, B = {x : x ∈ R, $x^2 = 4$} and C = {x : x ∈ Z, |x| ≤ 2}. Find (A ∪ B) ∩ C and (A − B) ∪ (B − C).

SECTION – D (1 × 5 = 5)

This section comprises of 1 long answer (LA) type question of 5 marks.

Q22. **(A)** Let U = {1, 2, 3, . . . , 10}, A = {1, 2, 3, 4, 5, 6}, B = {2, 4, 6, 8, 10} and C = {3, 6, 9}. Verify that **5**

(i) A − (B ∪ C) = (A − B) ∩ (A − C) **[2]**

(ii) A ∩ (B − C) = (A ∩ B) − (A ∩ C) **[3]**

OR

(B) Let A and B be subsets of a universal set U. Prove that

(i) A ∩ B′ = A − B **[2]**

(ii) A ⊂ B if and only if B′ ⊂ A′ **[3]**

SECTION – E (1 × 4 = 4)

This section comprises of 1 case study based question of 4 marks with sub-parts (i), (ii), (iii) of marks 1, 1, 2 respectively.

Q23. **Case Study:** Ten students of Class XI – Aditi, Bhavna, Chirag, Dev, Esha, Farhan, Gita, Hari, Isha and Jay – registered for the school's annual fest. Let U be the set of these ten students, R the set of students who joined the Robotics club and M the set of students who joined the Music club. The Venn diagram (Fig. 6) shows the registrations. **4**

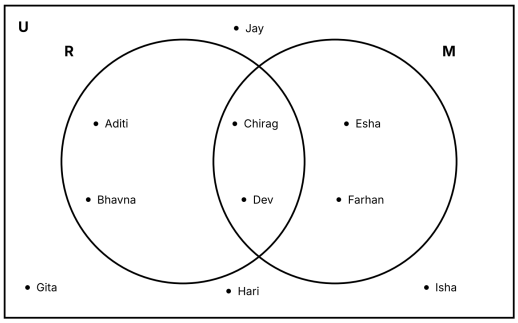


Fig. 6

Based on the given information, answer the following questions:

(i) Write R ∪ M in roster form. **[1]**

(ii) Write R ∩ M and R − M in roster form and state in words what each set represents. **[1]**

(iii) **(a)** Find (R ∪ M)′ and interpret the set. **[2]**

OR

(b) Verify that (R ∩ M)′ = R′ ∪ M′. **[2]**

— End of Question Paper —