

CLASS XI
WEEKLY TEST 1 (2025 - 26)
MATHEMATICS (041)
SET A2

Time : 1.5hrs.

M.M.40

General Instructions:

1. This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 9 MCQ's and 01 Assertion-Reason based question of 1 mark each.
3. Section B has 2 Very Short Answer (VSA)-type questions of 2 marks each.
4. Section C has 4 Short Answer (SA)-type questions of 3 marks each.
5. Section D has 2 Long Answer (LA)-type questions of 5 marks each.
6. Section E has 1 case-based assessment (4 marks) with sub parts.

Section A

1. The range of the real valued function $f(x) = \frac{|x-4|}{x-4}; x \neq 4$ is
 (a) $\{-1, 1\}$ (b) $\{1\}$ (c) $\mathbb{R}^-$ (d) $\mathbb{R}^+$
2. Find the domain of the function $f(x) = \frac{x^2+2x+1}{x^2-8x+12}$.
 (a) $[2, 6]$ (b) $\mathbb{R} - [2, 6]$ (c) $\mathbb{R} - \{2\}$ (d) $\mathbb{R} - \{2, 6\}$
3. If $f(x) = \frac{x-1}{x+1}$, then $f\left(\frac{1}{x}\right)$ is equal to
 (a) $-\frac{1}{x}$ (b) $\frac{1}{x}$ (c) $f(x)$ (d) $-f(x)$
5. The number of proper subsets of a set containing n elements is:
 (a) n (b) 2^{n-1} (c) 2^n (d) $2^n - 1$
4. What will be the domain for which the functions $f(x) = 2x^2 - 1$ and $g(x) = 1 - 3x$ are equal?
 (a) $\{-2, 1\}$ (b) $\{\frac{1}{2}, -2\}$ (c) $[\frac{1}{2}, 2]$ (d) $(-1, 2)$
6. If $A = \{(x, y): y = \frac{1}{x}, 0 \neq x \in \mathbb{R}\}$, $B = \{(x, y): y = -x, x \in \mathbb{R}\}$, then
 (a) $A \cap B = A$ (b) $A \cap B = B$ (c) $A \cap B = \phi$ (d) $A \cup B = A$
7. If A and B be two sets containing 3 and 6 elements respectively, then the sum of minimum and maximum number of elements in $A \cap B$ is
 (a) 3 (b) 6 (c) 0 (d) 9
8. Which of the following represents the set $\{x: x \in \mathbb{Z} \text{ and } |x| \leq 1\}$ in the roster form?
 (a) $\{-1, 0, 1\}$ (b) $\{1, -1\}$ (c) $\{0, 1\}$ (d) $[-1, 1]$

9. Two finite sets have m and n elements respectively. The total number of subsets of the first set is 192 more than the total number of subsets of the second set. The values of m and n respectively are

- (a) 7, 6 (b) 8, 6 (c) 8, 5 (d) 9, 7

10. **ASSERTION-REASON BASED QUESTIONS** 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.

Assertion(A): Let $A = \{1, 2, 3, 4, 6\}$. If R is the relation defined by $\{(a, b) : a, b \in A, b \text{ is exactly divisible by } a\}$ The relation R in roster form is $\{(6, 3), (6, 2), (4, 2)\}$.

Reason(R): For the relation R defined by $\{(a, b) : a, b \in A, b \text{ is exactly divisible by } a\}$, where $A = \{1, 2, 3, 4, 6\}$, the domain and range of R is $\{1, 2, 3, 4, 6\}$

Section B

11. Draw the rough sketch of the graph of the signum function. From the graph find the domain and the range of the function. (graph paper not required for the graph of the function)

12. If $R = \{(x, y) : x, y \in W, x^2 + y^2 = 25\}$, then write R as a set of ordered pairs.

OR

Write the interval form of set $A = \{x : x \in R, 5 < x \leq 11\}$ and write $[-4, 12]$ in set-builder form.

Section C

13. Let $f, g : R \rightarrow R$ be defined by $f(x) = 3x + 1$ and $g(x) = 2x - 2$. Define and evaluate the following functions: $(2f - g)(x)$ and $\left(\frac{f}{g}\right)(x)$

14. Let R be a relation from N to N defined by $R = \{(a, b) : a, b \in N \text{ and } a = b^2\}$. Which of the following is true? Justify your answer.

- (i) $(a, b) \in R$, implies $(b, a) \in R$ (ii) $(a, b) \in R, (b, c) \in R$ implies $(a, c) \in R$

OR

Find the domain and the range of the following function: $f(x) = \sqrt{9 - x^2}$

15. Let A and B be two sets such that $A \cap X = B \cap X = \emptyset$ and $A \cup X = B \cup X$ for some set X. Prove that $A = B$.

16. On the real axis, if set $A = [0, 3]$ and $B = [2, 6]$, then find the following in the set builder and interval form:

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

Section D

17. Find the domain of the functions $f(x) = \sqrt{5-x}$ and $g(x) = \frac{1}{\sqrt{x^2-4}}$. Hence find the domain of the function $f(x) + g(x) = \sqrt{5-x} + \frac{1}{\sqrt{x^2-4}}$.

Handwritten notes:
 $\sqrt{5-x} \Rightarrow x \leq 5$
 $\frac{1}{\sqrt{x^2-4}} \Rightarrow x < -2 \text{ or } x > 2$
 $\therefore \text{Domain} = (-\infty, -2) \cup (2, 5]$

18. Prove through Venn Diagram (i) $(A \cup B)' = (A' \cap B')$ and (ii) $(A \cap B)' = (A' \cup B')$

OR

If $A = \{3, 5, 7, 9, 11\}$, $B = \{7, 9, 11, 13\}$, $C = \{11, 13, 15\}$, $D = \{15, 17\}$ and $U = \text{set of all odd natural numbers less than } 20$; find

(i) $A \cap B$ *7, 9, 11*

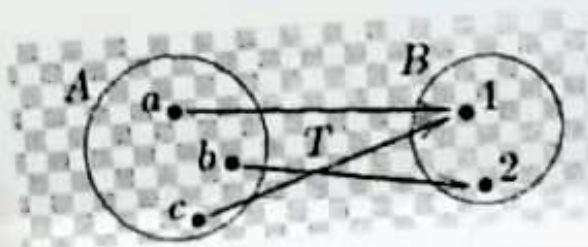
(ii) $A \cap (D \cup C)$ *11, 13, 15*

(iii) $(A \cup D) \cap (B \cup C)$ *7, 9, 11, 13, 15*

(iv) $[(A - B) \cap (C - D)]'$

Section E

19. (CASE STUDY)



The ordered pair of two elements a and b is denoted by (a, b) ; a is the first element (or first component) and b is the second element (or second component)

Cartesian product of two non-empty sets A and B is the set of all ordered pairs of elements from set A and B . In symbolic form it can be written as $A \times B = \{(a, b) : a \in A, b \in B\}$

Based on above information answer the following questions.

(i) If set A has 3 elements and set B has 2 elements, how many elements are there in $A \times B$?

(ii) If set A has 3 elements and set B has 2 elements, how many relations are there from A to B ?

(iii) If the ordered pairs $(a, -1)$ and $(5, b)$ belong to $\{(x, y) : y = 2x - 3\}$ find the values of a and b .

OR

Set A has 2 elements and set B has 3 elements. If $A = \{0, 1\}$ and $A \times B$ has elements $(1, 1), (1, 0), (1, 2)$, write the elements of set $B \times A$.