

Sri Vinayaga Tuition centre

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WEEKLY TEST II (CH 1)

MATHEMATICS

Total Marks: 100

Class: 10

Marks

Duration: 3 Hrs

SEC I

CHOOSE THE CORRECT ANSWERS

14 X 1 = 14

- Let f and g be two functions given by
 $f = \{(0,1), (2,0), (3,-4), (4,2), (5,7)\}$
 $g = \{(0,2), (1,0), (2,4), (-4,2), (7,0)\}$ then the range of $f \circ g$ is
 a) $\{0,2,3,4,5\}$ b) $\{-4,1,0,2,7\}$ c) $\{1,2,3,4,5\}$ d) $\{0,1,2\}$
- If there are 1024 relations from a set $A = \{1, 2, 3, 4, 5\}$ to a set B , then the number of elements in B is
 a) 3 b) 2 c) 4 d) 8
- The range of the relation $R = \{(x, x^2) \mid x \text{ is a prime number less than } 13\}$ is
 a) $\{2,3,5,7\}$ b) $\{2,3,5,7,11\}$
 c) $\{4,9,25,49,121\}$ d) $\{1,4,9,25,49,121\}$
- If $\{(a,8), (6,b)\}$ represents an identity function, then the value of a and b are respectively
 a) $(8,6)$ b) $(8,8)$ c) $(6,8)$ d) $(6,6)$
- $f(x) = (x + 1)^3 - (x - 1)^3$ represents a function which is
 a) linear b) cubic c) reciprocal d) quadratic
- $A = \{a,b,p\}$, $B = \{2,3\}$, $C = \{p,q,r,s\}$ then $n[(A \cup B) \times B]$ is
 a) 8 b) 20 c) 12 d) 16
- If the ordered pairs $(a + 2, 4)$ and $(5, 2a + b)$ are equal then (a, b) is
 a) $(2, -2)$ b) $(5, 1)$ c) $(2, 3)$ d) $(3, -2)$
- If $A = \{1,2\}$, $B = \{1,2,3,4\}$, $C = \{5,6\}$ and $D = \{5,6,7,8\}$ then state which of the following statement is true.
 a) $(A \times C) \subset (B \times D)$ b) $(B \times D) \subset (A \times C)$
 c) $(A \times B) \subset (A \times D)$ d) $(D \times A) \subset (B \times A)$
- Let $A = \{1,2,3,4\}$ and $B = \{4,8,9,10\}$. A function $f: A \rightarrow B$ given by $f = \{(1,4), (2,8), (3,9), (4,10)\}$ is a
 a) Many-one function b) Identity function
 c) One-to-one function d) Into function
- Let $n(A) = m$ and $n(B) = n$ then the total number of non-empty relations that can be defined from A to B is
 a) m^n b) n^m
 c) $2^{mn} - 1$ d) 2^{mn}

29. Consider the functions $f(x)$, $g(x)$, $h(x)$ as given below. Show that $(f \circ g) \circ h = f \circ (g \circ h)$ in each case.

$$f(x) = x - 1, g(x) = 3x + 1 \text{ and } h(x) = x^2$$

30. Let $A = \{1,2,3,4\}$ and $B = \{2,5,8,11,14\}$ be two sets. Let $f : A \rightarrow B$ be a function given by $f(x) = 3x - 1$. Represent this function
(i) by arrow diagram (ii) in a table form
(iii) as a set of ordered pairs (iv) in a graphical form

31. If the function $f : \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = \begin{cases} 2x + 7, & x < -2 \\ x^2 - 2, & -2 \leq x < 3 \\ 3x - 2, & x \geq 3 \end{cases}$

then find the values of

(i) $f(4)$ (ii) $f(-2)$ (iii) $f(4) + 2f(1)$ (iv) $\frac{f(1) - 3f(4)}{f(-3)}$

32. A company has four categories of employees given by Assistants (A), Clerks (C), Managers (M) and an Executive Officer (E). The company provide 10,000, 25,000, 50,000 and 1,00,000 as salaries to the people who work in the categories A, C, M and E respectively. If A_1, A_2, A_3, A_4 and A_5 were Assistants; C_1, C_2, C_3, C_4 were Clerks; M_1, M_2, M_3 were managers and E_1, E_2 were Executive officers and if the relation R is defined by xRy , where x is the salary given to person y , express the relation R through an ordered pair and an arrow diagram.

33. In each of the following cases state whether the function is bijective or not. Justify your answer.
(i) $f : \mathbb{R} \rightarrow \mathbb{R}$. defined by $f(x) = 2x + 1$ (ii) $f : \mathbb{R} \rightarrow \mathbb{R}$. defined by $f(x) = 3 - 4x^2$

34. Given $A = \{1,2,3\}$, $B = \{2,3,5\}$, $C = \{3,4\}$ and $D = \{1,3,5\}$, check if $(A \cap C) \times (B \cap D) = (A \times B) \cap (C \times D)$ is true?

35. Let f be a function $f : \mathbb{N} \rightarrow \mathbb{N}$ be defined by $f(x) = 3x + 2, x \in \mathbb{N}$
(i) Find the images of 1, 2, 3
(ii) Find the pre-images of 29, 53
(iii) Identify the type of function

36. Show that the function $f : \mathbb{N} \rightarrow \mathbb{N}$ defined by $f(m) = m^2 + m + 3$ is one-one function.

37. Consider the functions $f(x)$, $g(x)$, $h(x)$ as given below. Show that $(f \circ g) \circ h = f \circ (g \circ h)$ in each case.

$$f(x) = x - 4, g(x) = x^2 \text{ and } h(x) = 3x - 5$$

38. Represent each of the given relations by (a) an arrow diagram, (b) a graph and (c) a set in roster form, wherever possible.

$$\{(x,y) | x = 2y, x \in \{2,3,4,5\}, y \in \{1,2,3,4\}\}$$

39. Let $A = \{x \in \mathbb{W} | x < 2\}$, $B = \{x \in \mathbb{N} | 1 \leq x < 4\}$ and $C = \{3, 5\}$. Then verify that

$$(A \cup B) \times C = (A \times C) \cup (B \times C)$$

40. A Relation R is given by the set $\{(x,y) | y = x + 3, x \in \{0,1,2,3,4,5\}\}$. Determine its domain and range.

41. Let

$$A = \{x \in \mathbb{N} | 1 < x < 4\}, B = \{x \in \mathbb{W} | 0 \leq x < 2\} \text{ and } C = \{x \in \mathbb{N}$$

Then verify that

$$(i) A \times (B \cup C) = (A \times B) \cup (A \times C)$$

$$(ii) A \times (B \cap C) = (A \times B) \cap (A \times C)$$

42. A function $f: [-7, 6] \rightarrow \mathbb{R}$ is defined as follows.

$$f(x) = \begin{cases} x^2 + 2 + 1 & -7 \leq x < -5 \\ x + 5 & -5 \leq x \leq 2 \\ x - 1 & 2 < x < 6 \end{cases}$$

find (i) $2f(-4) + 3f(2)$ (ii) $f(-7) - f(-3) - f(-3)$

sec IV

ANSWER THE FOLLOWING QUESTIONS

$$2 \times 8 = 16$$

43. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{4}$ of the corresponding sides of the triangle PQR (scale factor $\frac{7}{4} > 1$).
44. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{2}{3}$ of the corresponding sides of the triangle PQR (scale factor $\frac{2}{3} < 1$).