

class: X

Unit Test - 1, 2.

Time: 3 hrs

Subject: Mathematics

Marks: 100

Part-A. $14 \times 1 = 14$

I. Answer All the Questions:-

1. IF $n(A \times B) = 6$ and $A = \{1, 3\}$ then $n(B)$ is
 a) 1 b) 2 c) 3 d) 6
2. $A = \{a, b, p\}$, $B = \{2, 3\}$, $C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is
 a) 8 b) 20 c) 12 d) 16
3. 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}
4. 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) $(3, -2)$
5. IF $f: A \rightarrow B$ is a bijection function and if $n(B) = 5$ then it is equal to
 a) 7 b) 5 c) 25 d) 10
6. IF $g = \{(1, 1), (2, 3), (3, 5), (4, 7)\}$ is a function given by $g(x) = \alpha x + \beta$ then the values of α and β are
 a) $(-1, 2)$ b) $(2, -1)$ c) $(-1, -2)$ d) $(1, 2)$
7. $f(x) = (x+1)^3 - (x-1)^3$ represents a function which is
 a) Linear b) Cubic c) reciprocal d) quadratic
8. Using Euclid's division lemma, if the cube of any positive integers is divided by 9 then the possible remainders are
 a) 0, 1, 8 b) 1, 4, 8 c) 0, 1, 3 d) 1, 3, 5
9. IF the HCF of 65 and 117 is expressible in the form of $65m - 117$, then the values of m is
 a) 4 b) 2 c) 1 d) 3
10. The sum of exponents of the prime factors in the prime factorization of 144 is
 a) 1 b) 2 c) 3 d) 6
11. An A.P consists of 31 terms. IF its 16th term is m , then the sum of all the terms of this A.P is
 a) $16m$ b) $62m$ c) $31m$ d) $31m$.

12. The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \dots$ is
 a) $\frac{1}{24}$ b) $\frac{1}{27}$ c) $\frac{2}{3}$ d) $\frac{1}{81}$.
13. The first term of an arithmetic progression is unity and the common difference is 4. Which of the following will be a term of this A.P.
 a) 4551 b) 10091 c) 7881 d) 13531
14. The value of $(1^3 + 2^3 + 3^3 + \dots + 15^3) - (1 + 2 + 3 + \dots + 15)$ is
 a) 14400 b) 14200 c) 14280 d) 14520

Part-B.

$10 \times 2 = 20$

II Answer Any Ten Questions:- (Q.No: 28 is compulsory)

15. If $B \times A = \{(-2, 3), (-2, 4), (0, 3), (0, 4), (3, 3), (3, 4)\}$ find A and B.
16. 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.
17. If $A = \{-2, -1, 0, 1, 2\}$ and $f: A \rightarrow B$ is an onto function defined by $f(x) = x^2 + x + 1$, then find B.
18. Show that the function $A: \mathbb{N} \rightarrow \mathbb{N}$ defined by $f(x) = x^2 + x + 3$ is one-one function.
19. If $f(x) = 2x + 5$ and $x \neq 0$ find $\frac{f(x+2) - f(x)}{x}$.
20. Find the domain of the function $f(x) = \sqrt{1 + \sqrt{1 - \sqrt{1 - x^2}}}$.
21. Find k if $f \circ f(k) = 5$, where $f(k) = 2k - 1$.
22. 'a' and 'b' are two positive integers s.t. $a^b \times b^a = 800$. Find 'a' and 'b'.
23. Find the number of terms in the A.P. 3, 6, 9, 12, 111.
24. Compute x, such that $10^4 \equiv x \pmod{19}$.
25. Find the sum $3 + 1 + \frac{1}{3} + \dots + \infty$.
26. Find a_8 and a_{15} whose n^{th} term is $a_n = \begin{cases} \frac{n^2 - 1}{n + 3} & ; n \text{ is even, } n \in \mathbb{N} \\ \frac{n^2}{2n + 1} & ; n \text{ is odd, } n \in \mathbb{N} \end{cases}$
27. In a G.P. 729, 243, 81, find t_7 .

28. Find the G.P in which the 2nd term is $\sqrt{6}$ and 6th term is $9\sqrt{6}$.

Part - C.

10x5 = 50

III Answer Any Ten Questions:- (Q.No: 42 is compulsory)

29. Let $A = \{x \in \mathbb{W} \mid x < 2\}$, $B = \{x \in \mathbb{N} \mid 1 < x \leq 4\}$ and $C = \{3, 5\}$.
Verify that $(A \cup B) \times C = (A \times C) \cup (B \times C)$.
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 is defined $f(x) = \begin{cases} x+2 & ; x > 1 \\ 2 & ; -1 \leq x \leq 1 \\ x-1 & ; -3 < x < -1 \end{cases}$
Find i) $f(3)$ ii) $f(0)$ iii) $f(-1.5)$ iv) $f(2) + f(-2)$.
32. The function t which maps temperature in Celsius (C) into temperature in Fahrenheit (F) is defined by $t(C) = F$ where $F = \frac{9}{5}C + 32$. Find i) $t(0)$ ii) $t(20)$ iii) $t(-10)$.
iv) the value of C when $t(C) = 212$.
v) the temperature when the Celsius value is equal to the Fahrenheit value.
33. Find x if $g \circ f(x) = f \circ g(x)$, given $f(x) = 3x + 1$, $g(x) = x + 3$.
34. Consider the functions $f(x) = x - 4$, $g(x) = x^2$ and $h(x) = 3x - 5$.
Show that $(f \circ g) \circ h = f \circ (g \circ h)$.
35. Find the HCF of 396, 504, 636.
36. The sum of three consecutive terms that are in A.P is 27 and their product is 288. Find the three terms.
37. The sum of first n , $2n$ and $3n$ terms of an A.P are S_1 , S_2 and S_3 respectively. Prove that $S_3 = 3(S_2 - S_1)$.
38. Find the sum of all natural numbers between 300 and 600 which are divisible by 7.

39. If a, b, c are three consecutive terms of an A.P. and x, y, z are three consecutive terms of a G.P. then prove that $x^{b-c} \times y^{c-a} \times z^{a-b} = 1$.
40. Find the sum to n terms of the series $5 + 55 + 555 + \dots$ to n terms.
41. Rekha has 15 square colour papers of sides $10\text{cm}, 11\text{cm}, 12\text{cm}, \dots, 24\text{cm}$. How much area can be decorated with these colour papers?
42. Let $A = \{6, 9, 15, 18, 21\}$; $B = \{1, 2, 4, 5, 6\}$ and $f: A \rightarrow B$ be defined by $f(x) = \frac{x-3}{3}$. Represent f by
 i) an arrow diagram. ii) a set of ordered pairs.
 iii) a table iv) a Graph.

Part - D.

$2 \times 8 = 16$

IV Answer All the Questions:-

43. a) Take a point which is 11cm away from the centre of a circle of radius 4cm and draw the two tangents to the circle from the point.
 (OR)
 b) Construct a triangle ΔPQR such that $QR = 5\text{cm}$, $\angle P = 30^\circ$ and the altitude from P to QR is of a length 4.2cm .
44. a) Draw the graph of $xy = 24$, $x, y > 0$. Using the graph find i) y when $x = 3$ ii) x when $y = 6$.
 (OR)
 b) Draw the graph of $y = x^2 + 3x - 4$ and hence use it to solve $x^2 + 3x - 4 = 0$.

... All the Best ...