

Standard - 10

Time Allowed: 3.00 Hours

MATHEMATICS

Maximum Marks: 100

PART - I

Note: 1. Answer all the questions.

14×1=14

2. Choose the best answer.

- If $f: A \rightarrow B$ is a bijective function and if $n(B) = 7$. Then $n(A) =$ _____.
a) 7 b) 49 c) 1 d) 14
- 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)
- $7^{4k} \equiv$ _____ (mod 100).
a) 1 b) 2 c) 3 d) 4
- The next term of the sequence $\frac{3}{16}, \frac{1}{18}, \frac{1}{12}, \frac{1}{18}, \dots$ is _____.
a) $\frac{1}{24}$ b) $\frac{1}{27}$ c) $\frac{2}{3}$ d) $\frac{1}{81}$
- The solution of $(2x-1)^2 = 9$ is equal to _____.
a) -1 b) 2 c) -1, 2 d) None of these
- The square root of $\frac{256x^8y^4z^{10}}{25x^6y^6z^6}$ is equal to _____.
a) $\frac{16}{5} \left| \frac{x^2z^4}{y^2} \right|$ b) $16 \left| \frac{y^2}{x^2z^4} \right|$ c) $\frac{16}{5} \left| \frac{y}{xz^2} \right|$ d) $\frac{16}{5} \left| \frac{xz^2}{y} \right|$
- Basic proportionality Theorem is also known as _____.
a) Thales theorem b) Angle bisector Theorem
c) Pythagoras theorem d) Alternate segment Theorem.
- If in triangles ABC and EDF, $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar, _____.
a) $\angle B = \angle E$ b) $\angle A = \angle D$
c) $\angle B = \angle D$ d) $\angle A = \angle F$
- The point of intersection of $3x-y=4$ and $x+y=8$ is _____.
a) (5, 3) b) (2, 4)
c) (3, 5) d) (4, 4)
- (2,1) is the point of intersection of two lines
a) $x - y - 3 = 0 ; 3x - y - 7 = 0$
b) $x + y = 3 ; 3x + y = 7$
c) $3x + y = 3 ; x + y = 7$
d) $x + 3y = 3 ; x - y - 7 = 0$
- The slope of the straight line $ax + by + c = 0$ is _____.
a) $\frac{a}{b}$ b) $\frac{b}{a}$ c) $\frac{-a}{b}$ d) $\frac{-b}{a}$
- The value of $\sin^2\theta + \frac{1}{1 + \tan^2\theta}$ is equal to _____.
a) $\tan^2\theta$ b) 1 c) $\cot^2\theta$ d) 0

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13. If $5x = \sec \theta$ and $\frac{5}{x} = \tan \theta$, then $x^2 - \frac{1}{x^2}$ is equal to _____.
- a) 25 b) $\frac{1}{25}$ c) 5 d) 1
14. The 10th term of the sequence of 0, 2, 6, 12, 20,.... is _____.
- a) 90 b) 100 c) 110 d) 120

PART - II**Note: Answer any TEN of the following.****10×2=20****Question Number 28 is compulsory.**

15. If $A \times B = \{(3, 2), (3, 4), (5, 2), (5, 4)\}$. Then find A and B.
16. Let $X = \{3, 4, 6, 8\}$. Determine whether the relation $R = \{(x, f(x)) / x \in X, f(x) = x^2 + 1\}$ is a function from X to \mathbb{N} ?
17. Use Euclid's Division Algorithm, To find the highest common factor (HCF) of 340 and 412.
18. Find the number of terms in the A.P. 3, 6, 9, 12, 11.
19. Find the GCD of the polynomials $x^3 + x^2 - x + 2$ and $2x^3 - 5x^2 + 5x - 3$.
20. Subtract $\frac{1}{x^2 + 2}$ from $\frac{2x^3 + x^2 + 3}{(x^2 + 2)^2}$.
21. Solve $2x^2 - 3x - 3 = 0$ by formula method.
22. Find the equation of a straight line whose inclination is 45° and y - intercept is 11.
23. Find the area of the triangle formed by the points (1, -1), (-4, 6) and (-3, -5).
24. Find the slope of a line joining the points $(5, \sqrt{5})$ with the origin.
25. Prove the following identities $\sqrt{\frac{1 + \sin \theta}{1 - \sin \theta}} = \sec \theta + \tan \theta$.
26. If $\triangle ABC$ is similar to $\triangle DEF$ such that $BC = 3\text{cm}$, $EF = 4\text{cm}$ and Area of $\triangle ABC = 54\text{cm}^2$. Find the area of $\triangle DEF$.
27. Determine the nature of the roots of the quadratic equations $x^2 - x - 1 = 0$.
28. Find the intercepts made by the line $7x - 5y + 35 = 0$ on the co-ordinate axes.

PART - III**Note: Answer any TEN of the following.****10×5=50****Question Number 42 is compulsory.**

29. Let $A = \{x \in \mathbb{N} / 1 < x < 4\}$, $B = \{x \in \mathbb{W} / 0 \leq x < 2\}$ and $C = \{x \in \mathbb{N} / x < 3\}$. Then verify that
- (i) $A \times (B \cup C) = (A \times B) \cup (A \times C)$
- (ii) $A \times (B \cap C) = (A \times B) \cap (A \times C)$
30. A function $f: [-5, 9] \rightarrow \mathbb{R}$ is defined as follows:
- $$f(x) = \begin{cases} 6x + 1 & ; -5 \leq x < 2 \\ 5x^2 - 1 & ; 2 \leq x < 6 \\ 3x - 4 & ; 6 \leq x \leq 9 \end{cases}$$

- find
- $f(-3) + f(2)$
 - $f(7) - f(1)$
 - $2f(4) + f(8)$
 - $\frac{2f(-2) - f(-6)}{f(4) + f(-2)}$
31. A person saved money every year, half as much as he could on the previous year. If he had totally saved ₹ 7875 in 6 years. Then how much did he save in the just year?
32. Find the sum of the series $6^2 + 7^2 + 8^2 + \dots + 21^2$.
33. Solve: $\frac{1}{2x} + \frac{1}{4y} - \frac{1}{3z} = \frac{1}{4}$; $\frac{1}{x} = \frac{1}{3y}$; $\frac{1}{x} - \frac{1}{5y} + \frac{4}{z} = 2\frac{2}{15}$.
34. Find the square root of polynomials $x^4 - 12x^3 + 42x^2 - 36x + 9$ by division method.
35. Basic Proportionality Theorem. State and Prove it.
36. Two poles of height 'a' metres and 'b' metres, are 'p' metres apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by $\frac{ab}{a+b}$ metres.
37. Find the area of the quadrilateral whose vertices are (-9, -2), (-8, -4), (2, 2) and (1, -3).
38. The line joining the points A(0,5) and B(4,1) is a tangent to a circle whose centre C is at the point (4,4). Find
- The equation of the line AB.
 - The equation of the line through C which is perpendicular to the line AB.
 - The co-ordinate of the point of contact of tangent line AB with the circle.
39. Prove that $\frac{\sin A}{1 + \cos A} + \frac{\sin A}{1 - \cos A} = 2 \operatorname{Cosec} A$.
40. If $\sqrt{3} \sin \theta - \cos \theta = 0$. Then show that $\tan 3\theta = \frac{3 \tan \theta - \tan^3 \theta}{1 - 3 \tan^2 \theta}$.
41. Let $A = \{1, 2, 3, 4\}$ and $B = \{2, 5, 8, 11, 14\}$ be two sets. Let $f : A \rightarrow B$ is a function given by $f(x) = 3x - 1$. Represent this function.
- By Arrow diagram
 - in a table form
 - as a set of ordered pairs
 - in a graphical form
42. If α, β are the roots of the equation $3x^2 + 7x - 2 = 0$, find the values of
- $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$
 - $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$

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PART - IV

Note: Answer all the questions.**8×2=16**

43. a) Construct a ΔPQR in which $PQ = 8\text{cm}$, $\angle R = 60^\circ$ and the median RG from R to PQ is 5.8cm . Find the length of the altitude from R to PQ .

(OR)

- b) Construct a triangle similar to a given triangle PQR with its sides equal to of the corresponding sides of the triangle PQR (Scale factor $\frac{7}{3} > 1$).

44. a) Varshika draw 6 circles with different sizes. Draw a graph for the relationship between the diameter and circumference (approximately related) of each circle as shown in the table and use it to find the circumference of a circle when its diameter is 6cm .

Diameter (x)cm	1	2	3	4	5
Circumference (y)cm	3.1	6.2	9.3	12.4	15.5

(OR)

- b) Draw the graph of $xy = 24$, $x, y > 0$. Using the graph.

Find (i) y when $x = 3$ (ii) x when $y = 6$.

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