

MODEL PUBLIC EXAMINATION - 2025**Class: 10****- MATHEMATICS****Time : 3 Hours****Total Marks : 100**

- Instructions :**
- (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
 - (2) Use Blue or Black ink to write and underline.

Notes :

- (i) This question paper contains **four** parts

PART I

Note:(1) Answer all the 14 questions.

14 × 1 = 14

(2) Choose the correct answer from the given four alternatives and write the option code and the corresponding answer.

1. If $n(A) = m$ 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}
2. $f(x) = (x+1)^3 - (x-1)^3$ represents a function which is .
 (A) linear (B) cubic (C) reciprocal (D) quadratic
3. The sum of the exponents of the prime factors in the prime factorization of 1729 is .
 (A) 1 (B) 2 (C) 3 (D) 4
4. The sum of the sequence $\frac{-3}{2}, \frac{-3}{2}, \frac{-3}{2}, \dots$ upto first 20 terms is .
 (A) 3 (B) $\frac{-3}{2}$ (C) 30 (D) 20
5. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ is
 (A) $\frac{9y}{7}$ (B) $\frac{9y^3}{(21y-21)}$ (C) $\frac{21y^2-42y-21}{3y^3}$ (D) $\frac{7(y^2-2y+1)}{y^2}$
6. Statement (i) : $x^4 + 10x^3 + 31x^2 + 30x + 19$ is a perfect square
 Statement (ii) : A Quadratic equation must have 2 roots
 (A) Both statements (i) & (ii) are true.
 (B) Statement (i) is true but statement (ii) is false.
 (C) Statement (i) is false but statement (ii) is true
 (D) Both statements (i) & (ii) are false.
7. If A is a 2×3 matrix and B is a 3×4 matrix, how many columns does AB have _____.
 (A) 3 (B) 4 (C) 2 (D) 5
8. If in $\triangle ABC$, $DE \parallel BC$. $AB = 3.6$ cm, $AC = 2.4$ cm and $AD = 2.1$ cm then the length of AE is _____.
 (A) 1.4 cm (B) 1.8 cm (C) 1.2 cm (D) 1.05 cm

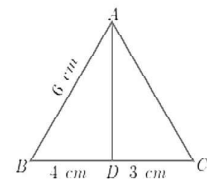
9. The slope of the line joining $(12, 3)$, $(4, a)$ is $\frac{1}{8}$. The value of 'a' is _____.
- (A) 1 (B) 4 (C) 5 (D) 2
10. A straight line has equation $8y = 4x + 21$ Which of the following is true?
- (A) The slope is 0.5 and the y intercept is 2.6
 (B) The slope is 5 and the y intercept is 1.6
 (C) The slope is 0.5 and the y intercept is 1.6
 (D) The slope is 5 and the y intercept is 2.6
11. If $a \cot \theta + b \operatorname{cosec} \theta = p$ and $b \cot \theta + a \operatorname{cosec} \theta = q$, then $p^2 - q^2$ is equal to _____.
- (A) $a^2 - b^2$ (B) $b^2 - a^2$ (C) $a^2 + b^2$ (D) $b^2 - a^2$
12. The total surface area of a cylinder whose radius is $\frac{1}{3}$ of its height is _____.
- (A) $\frac{9\pi h^2}{8}$ sq.units (B) $24\pi h^2$ sq.units (C) $\frac{8\pi h^2}{9}$ sq.units (D) $\frac{56\pi h^2}{9}$ sq.units
13. If the radius of the base of a cone is doubled and the height is tripled, then the volume is _____.
- (A) made 6 times (B) made 12 times (C) made 4 times (D) made 2 times
14. Which of the following is incorrect?
- (A) $P(A) > 1$ (B) $0 \leq P(A) \leq 1$ (C) $P(\phi) = 0$ (D) $P(A) + P(\bar{A}) = 1$

PART - II

Answer any 10 questions. Question no. 28 is compulsory.

10 × 2 = 20

15. If $A \times B = \{(3,2), (3,4), (5,2), (5,4)\}$, then find A and B.
16. If $f(x) = x^2 - x$, then find $f(x-1)$ & $f(x+1)$
17. Find the number of terms in the A.P. 3, 6, 9, 12, ..., 111.
18. If $1^3 + 2^3 + 3^3 + \dots + k^3 = 44100$, then find $1 + 2 + 3 + \dots + k$.
19. Find the excluded values of the expression $\frac{x+10}{8x}$.
20. Determine the nature of the roots for the quadratic equation $\sqrt{2}t^2 - 3t + 3\sqrt{2} = 0$.
21. In the Figure AD is the bisector of $\angle A$. If $BD = 4$ cm, $DC = 3$ cm and $AB = 6$ cm, then find AC.
22. If the three points $(3, -1)$, $(a, 3)$ and $(1, -3)$ are collinear, find the value of a.



23. Find the equation of a straight line which is parallel to the line $3x - 7y = 12$ and passing through the point $(6,4)$
24. Prove that $\cos^2 \theta + \frac{1}{1+\cot^2 \theta} = 1$
25. The curved surface area of a right circular cylinder of height 14 cm is 88 cm^2 . Find the diameter of the cylinder.
26. The volumes of two cones of same base radius are 3600 cm^3 and 5040 cm^3 . Find the ratio of heights.
27. If $P(A) = \frac{2}{3}, P(B) = \frac{2}{5}, P(A \cup B) = \frac{1}{3}$, then find $P(A \cap B)$
28. Mean and standard deviation of a data are 15 and 9 respectively. If 3 is added to each value of the data, then find the coefficient of variation of the new data

PART - III

Answer any 10 questions. Question no. 42 is compulsory.

$10 \times 5 = 50$

29. 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.
30. If $f(x) = x - 1, g(x) = 3x + 1$ and $h(x) = x^2$. Show that $(f \circ g) \circ h = f \circ (g \circ h)$.
31. Find the HCF by using Euclid's Division Algorithm of 396, 504, and 636.
32. In a G.P. the product of three consecutive terms is 27 and the sum of the product of two terms taken at a time is $\frac{57}{2}$. Find the three terms.
33. If $9x^4 + 12x^3 + 28x^2 + ax + b$ is a perfect square, find the values of a and b
34. If $A = \begin{pmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{pmatrix}, B = \begin{pmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{pmatrix}$ verify that $(AB)^T = B^T A^T$.
35. State and prove Pythagoras theorem.
36. Find the value of k , if the area of a quadrilateral is 28 sq units, whose vertices are taken in the order $(-4, -2), (-3, k), (3, -2)$ and $(2, 3)$
37. If $D(11, 7), E(13.5, 4)$ and $F(9.5, 4)$ are the mid points of the sides AB, BC and AC of triangle ABC respectively, then find the equation of the median from the vertex C
38. Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse as observed from the ships are 30° and 45° respectively. If the lighthouse is 200 m high, find the distance between the two ships. ($\sqrt{3}=1.732$)

39. If the radii of the circular ends of a frustum which is 45 *cm* high are 28 *cm* and 7 *cm*, find the volume of the frustum
40. A silver cup in the shape of a hemisphere surmounted by a cylinder. The height of the silver cup is 11.25 *cm* and its common diameter is 10.5 *cm*. Find its capacity
41. Two dice are rolled together. Find the probability of getting a doublet or sum of faces as 4.
42. A rectangular park is to be designed whose breadth is 4 *m* less than its length. Its area is to be 6 sq. metres more than the area of a park that has already been made in the shape of an isosceles triangle with its base as the breadth of the rectangular park and of altitude 10 *m*. Find the length and breadth of the rectangular park.

PART IV

Answer the following:

$$2 \times 8 = 16$$

43. a) Draw a circle of diameter 6 *cm* from a point *P* which is 8 *cm* away from its centre. Draw the two tangents *PA* and *PB* to the circle and measure their lengths.

(OR)

- b) Draw ΔPQR such that $PQ = 6.8$ *cm*, vertical angle is 50° and the bisector of the vertical angle meets the base at *D* where $PD = 5.2$ *cm*

44. a) Nishanth is the winner in a marathon race of 12 *km* distance. He ran at the uniform speed of 12 *km/hr* and reached the destination in 1 hour. He was followed by Aradhana, Jeyanth, Sathya and Swetha with their respective speeds of 6 *km/hr*, 4 *km/hr*, 3 *km/hr* and 2 *km/hr*. And, they covered the distance in 2 hrs, 3 hrs, 4 hrs and 6 hours respectively. Draw the speed-time graph and use it to find the time taken by Kaushik with his speed of 2.4 *km/hr*.

(OR)

- b) Draw the graph and discuss the nature of solutions of the quadratic equation $x^2 - 9x + 20 = 0$.

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