

10

MODEL PUBLIC EXAM - 2022

RMHS

MATHEMATICS

Time Allowed : 3 Hours]

Tamil & English Version)

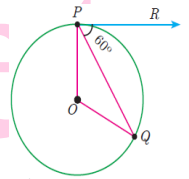
[Maximum Marks: 100

PART - I

(14 x 1 = 14)

Note: Answer all the Questions. Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer:

- $A = \{a, b, p\}$, $B = \{2, 3\}$, $C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is
(A) 8 (B) 20 (C) 12 (D) 16
- The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is
(A) 2025 (B) 5220 (C) 5025 (D) 2520
- If a, b, c are in A.P., then $\frac{a-b}{b-c}$ is equal to (A) $\frac{a}{b}$ (B) $\frac{b}{c}$ (C) $\frac{a}{c}$ (D) 1
- If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is
(A) 3 (B) 5 (C) 6 (D) 8
- $\frac{a^3}{a-b} + \frac{b^3}{b-a}$ is equal to (A) $a^2 + ab + b^2$ (B) $a^2 - ab + b^2$ (C) $a^2 - b^2$ (D) $a^3 + b^3$
- In figure if PR is tangent to the circle at P and O is the centre of the circle, then $\angle POQ$ is
(A) 120° (B) 100° (C) 110° (D) 90°
- In $\triangle LMN$, $\angle L = 60^\circ$, $\angle M = 50^\circ$. If $\triangle LMN \sim \triangle PQR$ then the value of $\angle R$ is
(A) 40° (B) 70° (C) 30° (D) 110°
- 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)
- The x intercept of the line $2x - y = 10$ is (A) 5 (B) 10 (C) -10 (D) Not defined
- A tower is 60 m high. Its shadow is x metres shorter when the sun's altitude is 45° than when it has been 30° , then x is equal to
(A) 41.92 m (B) 43.92 m (C) 43 m (D) 45.6 m
- In a hollow cylinder, the sum of the external and internal radii is 14 cm and the width is 4 cm. If its height is 20 cm, the volume of the material in it is
(A) $5600\pi \text{ cm}^3$ (B) $1120\pi \text{ cm}^3$ (C) $56\pi \text{ cm}^3$ (D) $3600\pi \text{ cm}^3$
- The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is (A) 1 : 2 : 3 (B) 2 : 1 : 3 (C) 1 : 3 : 2 (D) 3 : 1 : 2
- Which of the following is incorrect?
(A) $P(A) > 1$ (B) $0 \leq P(A) \leq 1$ (C) $P(\emptyset) = 0$ (D) $P(A) + P(\bar{A}) = 1$
- The probability of getting 53 Mondays in a leap year is
(A) $\frac{2}{7}$ (B) $\frac{1}{7}$ (C) $\frac{2}{53}$ (D) $\frac{1}{53}$



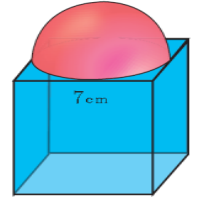
PART – II**(10 x 2 = 20)****Note: Answer any 10 questions. Question No.28 is compulsory**

15. Find $A \times B$ and $B \times A$ if $A = \{2, -2, 3\}$ and $B = \{1, -4\}$
16. Define: "RELATION"
17. Is $7 \times 5 \times 3 \times 2 + 3$ a composite number? Justify your answer
18. Write an A.P. whose first term is 7 and common difference is -5 .
19. Find the excluded values of the expression $\frac{y}{y^2 - 25}$
20. Find the square root of $\frac{144 a^8 b^{12} c^{16}}{81 f^{12} g^4 h^{14}}$
21. If $\triangle ABC$ is similar to $\triangle DEF$ such that $BC = 3cm$, $EF = 4cm$ and area of $\triangle ABC = 54cm^2$. Find the area of $\triangle DEF$
22. State Ceva's Theorem
23. Find the equation of a line through the pair of points $(2, 3)$ and $(-7, -1)$
24. A tower stands vertically on the ground. From a point on the ground, which is $48m$ away from the foot of the tower, the angle of elevation of the top of the tower is 30° . Find the height of the tower.
25. If the base area of a hemispherical solid is 1386 square meters, then find its total surface area?
26. Find the volume of a cylinder whose height is $2 m$ and whose base area is $250 m^2$
27. Two coins are tossed together. What is the probability of getting different faces on the coins?
28. Find the angle of inclination of the straight line whose equation is $\sqrt{3}x - y + 2 = 0$.

PART – III**(10 x 5 = 50)****Note: Answer any 10 questions. Question No.42 is compulsory**

29. Let $A = \{x \in \mathbb{N} / 1 < x < 4\}$, $B = \{x \in \mathbb{W} \mid 0 \leq x < 2\}$ and $C = \{x \in \mathbb{N} \mid x < 3\}$. Then verify that $A \times (B \cap C) = (A \times B) \cap (A \times C)$
30. Find the HCF of 396, 504, 636.
31. Two A.P.'s have the same common difference. The first term of one A.P. is 2 and that of the other is 7. Show that the difference between their 10th terms is the same as the difference between their 21st terms, which is the same as the difference between any two corresponding terms
32. Find the LCM of the following polynomials $a^2 + 4a - 12$, $a^2 - 5a + 6$ whose GCD is $a - 2$
33. Find the values of 'k' for which the quadratic equation $kx^2 - (8k+4)x + 81 = 0$ has real and equal roots?

34. Prove that when a straight line is drawn parallel to one side of a triangle intersecting the other two sides, then it divides the sides in the same ratio.
35. Show that the angle bisectors of a triangle are concurrent
36. Find the area of the quadrilateral formed by the points (6, 9), (7, 4), (4, 2) and (3, 7)
37. A line makes positive intercepts on coordinate axes whose sum is 7 and it passes through (-3, 8). Find its equation.
38. From the top of the tower 60m high, the angles of the depression of the top and bottom of a vertical lamp post are observed to be 38° and 60° respectively. Find the height of the lamp post. ($\tan 38^\circ = 0.7813$, $\sqrt{3} = 1.732$)
39. The volume of a solid right circular cone is 11088 cm^3 . If its height is 24 cm, then find the radius of the cone.
40. As shown in the figure a cubical block of side 7cm is surmounted by a hemisphere. Find the surface area of the solid.
41. Two dice are rolled. Find the probability that the sum of outcomes is (i) equal to 4 (ii) greater than 10 (iii) less than 13
42. If $m - nx + 28x^2 + 12x^3 + 9x^4$ is a perfect square, then find the values of m and n .



PART - IV

(2 x 8 = 16)

Note: Answer the following questions

43. a) Construct a ΔPQR in which $QR = 5 \text{ cm}$, $\angle P = 40^\circ$ and the median PG from P to QR is 4.4 cm. Find the length of the altitude from P to QR . **[OR]**
- b) Draw a circle of radius 4.5 cm. Take a point on the circle. Draw the tangent at that point using the alternate - segment theorem.
44. a) Graph the quadratic equation of $x^2 - 9 = 0$ and state its nature of solutions. **[OR]**
- b) Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x - 2 = 0$.