

Time Allowed: 3 Hours

Maximum 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 and pencil to draw diagrams.

Part I - Choose the Best Answer**14 X 1 = 14**

1. $A = \{a, b, p\}$, $B = \{2, 3\}$, $C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is
 (1) 8 (2) 20 (3) 12 (4) 16
2. The sum of the exponents of the prime factors in the prime factorization of 1729 is
 (1) 1 (2) 2 (3) 3 (4) 4
3. In an A.P., the first term is 1 and the common difference is 4. How many terms of the A.P. must be taken for their sum to be equal to 120?
 (1) 6 (2) 7 (3) 8 (4) 9
4. A system of three linear equations in three variables is inconsistent if their planes:
 (1) intersect only at a point (2) intersect in a line
 (3) coincides with each other (4) do not intersect
5. The solution of $(2x - 1)^2 = 9$ is equal to
 (1) -1 (2) 2 (3) -1, 2 (4) None of these
6. If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is
 (1) 3 (2) 5 (3) 6 (4) 8
7. If the roots of the equation $q^2 x^2 + p^2 x + r^2 = 0$ are the squares of the roots of the equation $qx^2 + px + r = 0$, then q, p, r are in ____
 (1) A.P (2) G.P (3) Both A.P and G.P (4) none of these
8. In a ΔABC , AD is the bisector of $\angle BAC$. If $AB = 8$ cm, $BD = 6$ cm and $DC = 3$ cm. The length of the side AC is
 (1) 6 cm (2) 4 cm (3) 3 cm (4) 8 cm
9. The x-intercept of the line $3x - 2y + 12 = 0$ is
 (1) 6 (2) -6 (3) 4 (4) -4
10. When proving that a quadrilateral is a parallelogram by using slopes you must find
 (1) The slopes of two sides (2) The slopes of two pair of opposite sides
 (3) The lengths of all sides (4) Both the lengths and slopes of two sides

11. A tower is 60 m height. Its shadow is x meters shorter when the sun's altitude is 45° than when it has been 30° , then x is equal to
(1) 41.92 m (2) 43.92 m (3) 43 m (4) 45.6 m
12. A solid sphere of radius x cm is melted and cast into a shape of a solid cone of same radius. The height of the cone is
(1) $3x$ cm (2) x cm (3) $4x$ cm (4) $2x$ cm
13. 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
(1) $5600 \pi \text{ cm}^3$ (2) $11200 \pi \text{ cm}^3$ (3) $56 \pi \text{ cm}^3$ (4) $3600 \pi \text{ cm}^3$
14. In a family of 3 children, probability of having atleast one boy is
(1) $1/3$ (2) $7/8$ (3) $3/8$ (4) $1/2$

Part II - 2 Marks - Qn No 28 is Compulsory

10 X 2 = 20

15. If $A \times B = \{(3, 2), (3, 4), (5, 2), (5, 4)\}$ then find A and B
16. Find the LCM and HCF of 408 and 170 by applying the fundamental theorem of arithmetic.
17. Write an A.P. whose first term is 20 and common difference is 8
18. Pari needs 4 hours to complete a work. His friend Yuvan needs 6 hours to complete the same work. How long will it take to complete if they work together?
19. Find the zeroes of the quadratic expression $x^2 + 8x + 12$
20. The perimeter of a right triangle is 60 cm. Its hypotenuse is 25 cm. Find the area of the triangle.
21. The perimeters of two similar triangles ABC and PQR are respectively 36 cm and 24 cm. If $PQ = 10$ cm, find AB.
22. Show that the points $P(-1.5, 3)$, $Q(6, -2)$, $R(-3, 4)$ are collinear.
23. Find the equation of a straight line passing through $(5, 7)$ and is parallel to X axis
24. A tower stands vertically on the ground. From a point on the ground, which is 48 m 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 total surface area of a cone of radius 7cm is 704 cm^2 , then find its slant height.
26. 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.
27. Write the sample space for tossing three coins using tree diagram
28. In $\triangle ABC$, AD is the bisector of $\angle A$ meeting side BC at D, if $AB = 10 \text{ cm}$, $AC = 14 \text{ cm}$ and $BC = 6 \text{ cm}$, find BD and DC

Part III - 5 Marks - Qn No 42 is Compulsory

10 X 5 = 50

29. Let $A = \{x \in W \mid x < 2\}$, $B = \{x \in N \mid 1 < x \leq 4\}$ and $C = \{3, 5\}$.

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

30. Find the HCF of 396, 504, 636
31. In an A.P., sum of four consecutive terms is 28 and their sum of their squares is 276. Find the four numbers
32. If one root of the equation $3x^2 + kx + 81 = 0$ (having real roots) is the square of the other then find k.
33. Simplify : $\frac{1}{x^2 - 5x + 6} + \frac{1}{x^2 - 3x + 2} - \frac{1}{x^2 - 8x + 15}$
34. A passenger train takes 1 hr more than an express train to travel a distance of 240 km from Chennai to Virudhachalam. The speed of passenger train is less than that of an express train by 20 km per hour. Find the average speed of both the trains.

35. A girl looks the reflection of the top of the lamp post on the mirror which is 66 m away from the foot of the lamppost. The girl whose height is 12.5 m is standing 2.5 m away from the mirror. Assuming the mirror is placed on the ground facing the sky and the girl, mirror and the lamppost are in a same line, find the height of the lamp post.
36. State and Prove Pythagoras Theorem
37. Find the area of the quadrilateral formed by the points (8, 6), (5, 11), (-5, 12) & (-4, 3)
38. Prove analytically that the line segment joining the mid-points of two sides of a triangle is parallel to the third side and is equal to half of its length.
39. 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. ($\sqrt{3} = 1.732$)
40. An industrial metallic bucket is in the shape of the frustum of a right circular cone whose top and bottom diameters are 10 m and 4 m and whose height is 4 m. Find the curved and total surface area of the bucket.
41. A toy is in the shape of a cylinder surmounted by a hemisphere. The height of the toy is 25 cm. Find the total surface area of the toy if its common diameter is 12 cm.
42. Two unbiased dice are rolled once. Find the probability of getting
(i) a doublet (equal numbers on both dice) (ii) the product as a prime number (iii) the sum as a prime number (iv) the sum as 1.

Part IV - 8 Marks - All Questions are Compulsory

2 X 8 = 16

43. a) 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 $\frac{7}{4} > 1$) (or)
b) Draw a triangle ABC of base BC = 5.6 cm, $\angle A = 40^\circ$ and the bisector of $\angle A$ meets BC at D such that CD = 4 cm
44. a) Discuss the nature of solutions of the quadratic equations. $x^2 + x - 12 = 0$ (or)
b) Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x - 2 = 0$.

- K.SARAVANAM