

S

Reg. No.:

			6	0	9
--	--	--	---	---	---

COMMON HALF YEARLY EXAMINATION - 2025

Std - X

Time :3.00 Hrs

Mathematics

Marks: 100

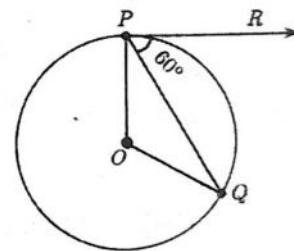
Part - I

Note: i) Answer all the questions:

14 x 1 = 14

ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer.

- If there are 1024 relations from a set $A = \{1, 2, 3, 4, 5\}$ to a set B, then the number of elements in B is
 a) 3 b) 2 c) 4 d) 8
- 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) $(1, 2)$
- 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
- The sequences $-3, -3, -3, \dots$ is
 a) an A.P. only b) a G.P. only c) both A.P. and G.P. d) neither A.P nor G.P
- If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k
 a) 3 b) 5 c) 6 d) 8
- Transpose of a column matrix is
 a) unit matrix b) diagonal matrix c) column matrix
 d) row matrix
- 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°
- The straight line given by the equation $y = 11$ is
 a) parallel to x axis b) parallel to y axis c) passing through the origin
 d) passing through the point $(11, 0)$
- $(2, 1)$ 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) $x + 3y - 3 = 0; x - y - 7 = 0$
- If $\sin\theta = \cos\theta$, then $2 \tan^2 \theta + \sin^2\theta - 1$ is equal to
 a) $\frac{-3}{2}$ b) $\frac{3}{2}$ c) $\frac{2}{3}$ d) $\frac{-2}{3}$
- If two solid hemisphere of the same base radius r units are joined together along their bases, then curved surface area of this new solid is
 a) $4\pi r^2$ sq. units b) $6\pi r^2$ sq. units c) $3\pi r^2$ sq. units d) $8\pi r^2$ sq. units
- The height and radius of the cone of which the frustum is a part are h_1 units and r_1



units respectively. Height of the frustum is h_2 units and the radius of the smaller base is r_2 units. If $h_2 : h_1 = 1:2$ then $r_2 : r_1$ is

a) 1 : 3 b) 1:2 c) 2:1 d) 3:1

13. The standard deviation of a data is 3. If each value is multiplied by 5 then the new variance is

a) 3 b) 15 c) 5 d) 225

14. Which of the following cannot be the probability of an event?

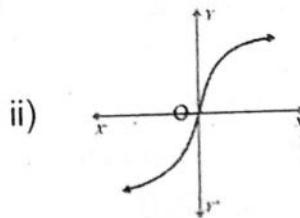
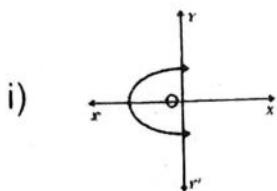
a) 2/3 b) -1.5 c) 15% d) 0.7

Part - II

10x2=20

Answer any 10 questions . Question No. 28 compulsory.15. If $B \times A = \{(-2,3), (-2,4), (0,3), (0,4), (3,3), (3,4)\}$, find A and B.

16. Determine whether the graph given below represent functions. Give reason for your answer concerning each graph.



17. We have 34 cakes. Each box can hold 5 cakes only. How many boxes we need to pack and how many cakes are unpacked?

18. Find the sum to infinity of $9+3+1+\dots$

19. Solve : $2x^2 - x + \frac{1}{8} = 0$

20. If $A = \begin{vmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{vmatrix}$ then find the transpose of $-A$.

21. If $\triangle ABC$ is similar to $\triangle DEF$ such that $BC = 3$ cm, $EF = 4$ cm and area of $\triangle ABC = 5\text{cm}^2$ Find the area of $\triangle DEF$.22. Find the slope of a line joining the points $(5, \sqrt{5})$ with the origin.23. Find the intercepts made by the line $4x - 9y + 36 = 0$ on the coordinate axes.

24. Prove that $\frac{\cos\theta}{1+\sin\theta} = \sec\theta - \tan\theta$.

25. A cylindrical drum has a height of 20 cm and base radius of 14cm. Find its total surface area.

26. If the range and the smallest value of a set of data are 36.6 and 13.4 respectively, then find the largest value.

27. What is the probability that a leap year selected at random will contain 53 Saturdays?

28. Find the value of a volume of a sphere whose surface area is $36\pi \text{ sq.cm}$.

Part - III

10 x 5 = 50

Answer any 10 questions. Q. No. 42 is compulsory:29. Let $A = \{x \in W \mid x < 2\}$, $B = \{x \in N \mid 1 < x \leq 4\}$ and $C = \{3, 5\}$. Verify that $(A \cup B) \times C = (A \cup C) \cup (B \times C)$

Ax C

30. If $f(x) = x - 4$, $g(x) = x^2$ and $h(x) = 3x - 5$. Prove that $(fog)oh = fo(goh)$

31. A brick staircase has a total of 30 steps. Then bottom step requires 100 bricks. Each successive step requires two bricks less than the previous step.

- How many bricks are required for the top most step?
- How many bricks are required to build the staircase?

32. Find the sum to n terms of the series $5 + 55 + 555 + \dots$

33. Find the value of m and n , if $x^4 - 8x^3 + mx^2 + nx + 16$ is a perfect square.

34. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ show that $A^2 - 5A + 7I_2 = 0$

35. State and prove Pythagoras theorem.

36. Find the area of the quadrilateral formed by the points $(8, 6)$, $(5, 11)$, $(-5, 12)$ and $(-4, 3)$

37. From the top of a lighthouse, the angle of depression of two ships on the opposite sides of it are observed to be 30° and 60° . If the height of the lighthouse is h meters and the line joining the ships passes through the foot of the lighthouse, show that the

distance between the ships is $\frac{4h}{\sqrt{3}}$ m

38. 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.

39. An aluminium sphere of radius 12 cm is melted to make a cylinder of radius 8 cm. Find the height of the cylinder.

40. The marks scored by the students in a slip test are given below. Find the standard deviation of their marks.

x	4	6	8	10	12
f	7	3	5	9	5

41. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8.

42. Find the equation of a straight line perpendicular to $2x - 3y + 6 = 0$ and passes through the midpoint of the line segment joining the points $(-4, -7)$ and $(6, 5)$

Part - IV

Answer all the questions:

2 x 8 = 16

43. a) Construct a triangle ΔPQR such that $QR = 5\text{cm}$ $\angle P = 30^\circ$ and the altitude from P to QR is of length 4.2 cm. (OR)
 b) Draw the two tangents from a point which is 10 cm away from the centre of a circle of radius 5 cm. Also measure the lengths of the tangents.

44. a) Discuss the nature of solutions of the quadratic equation $x^2 - 8x + 16 = 0$ (OR)
 b) 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 6 cm.

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