



Standard 10

Time: 3.00 Hrs.

MATHS

Maximum Marks: 100

PART - I

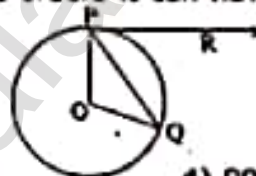
Note: i) Answer all the 14 questions.

14×1=14

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

- 1) If $A = \{a, b, c, d\}$, $B = \{2, 3\}$, $C = \{p, q, r, s\}$ then, $n[(A \cup C) \times B] =$
1) 8 2) 20 3) 12 4) 16
- 2) Let f and g be two functions given by $f = \{(0, 1), (2, 0), (3, -4), (4, 2), (5, 7)\}$,
 $g = \{(0, 2), (1, 0), (2, 4), (-4, 2), (7, 0)\}$ then the range of fg is
1) $\{0, 2, 3, 4, 5\}$ 2) $\{-4, 1, 0, 2, 7\}$ 3) $\{1, 2, 3, 4, 5\}$ 4) $\{0, 1, 2\}$
- 3) The sum of the exponents of the prime factors in the prime factorization of 1729 is
1) 1 2) 2 3) 3 4) 4
- 4) If $A = 2^{65}$ and $B = 2^{64} + 2^{63} + 2^{62} + \dots + 2^0$ which of the following is true?
1) B is 2^{64} more than A 2) A and B are equal
3) B is larger than A by 1 4) A is larger than B by 1
- 5) 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
- 6) The solution of $(2x-1)^2 = 9$ is equal to
1) -1 2) 2 3) -1, 2 4) None of these
- 7) If a matrix has 20 elements, what are the possible orders it can have?
1) 2 2) 6 3) 4 4) 0

- 8) In figure, If PR is tangent to the circle at P and O is the centre of the circle, then $\angle POQ$ is



- 1) 120° 2) 100° 3) 110° 4) 90°
- 9) The value of m for which point $(2, 3)$ lie on the line $2x - my + 11 = 0$ is
1) -5 2) 0 3) 3 4) 5
- 10) The probability of getting a job for a person is $x/3$. If the probability of not getting the job is $2/3$ then the value of x is
1) 2 2) 1 3) 3 4) 1.5
- 11) If the ratio of the height of a tower and the length of its shadow is $\sqrt{3} : 1$, then the angle of elevation of the sun has measure
1) 45° 2) 30° 3) 90° 4) 60°
- 12) The variance of the first 11 natural numbers is
1) 121 2) 120 3) 10 4) 11
- 13) The ratio of the volumes of a cylinder; a cone and a sphere, if each has the same diameter and same height is
1) 1:2:3 2) 2:1:3 3) 1:3:2 4) 3:1:2
- 14) Probability of $A \cap \bar{A}$ is
1) $P(A) \times P(\bar{A})$ 2) $P(A)$ 3) $P(A) + P(\bar{A})$ 4) 0

PART - II

Note: i) Answer 10 questions.

ii) Question Number 28 is compulsory. $10 \times 2 = 20$

- 15) If $A = \{-2, -1, 0, 1, 2\}$ and $f: A \rightarrow B$ is an onto function defined by $f(x) = x^2 + x + 1$ then find B .

- 16) Find the domain of the function $f(x) = \sqrt{1 + \sqrt{1 - \sqrt{1 - x^2}}}$.

- 17) Find the first five terms of the following sequence:

$$a_1 = 1, a_2 = 1, a_n = \frac{a_{n-1}}{a_{n-2} + 3}; n \geq 3, n \in \mathbb{N}.$$

- 18) Find the sum of all odd positive integers less than 450.

- 19) Find the excluded values of the following expression $\frac{7p+2}{8p^2+13p+5}$.

- 20) Determine the nature of the roots of the quadratic equation $15x^2 + 11x + 2 = 0$.

- 21) In two concentric circles, a chord of length 16 cm of larger circle becomes a tangent to the smaller circle whose radius is 6 cm. Find the radius of the larger circle.

- 22) Find the intercepts made by the line $4x - 9y + 36 = 0$ on the coordinate axes.

- 23) Prove that $\frac{\sin^3 A + \cos^3 A}{\sin A + \cos A} + \frac{\sin^3 A - \cos^3 A}{\sin A - \cos A} = 2$.

- 24) The slant height of a frustum of a cone is 5 cm and the radii of its ends are 4 cm and 1 cm. Find its curved surface area.

10M

$$25) \text{ Find the values of } a, b, c, d, \text{ if } \begin{pmatrix} a & 1 \\ 2b & -2 \end{pmatrix} + \begin{pmatrix} 9 & c \\ 4 & d \end{pmatrix} = \begin{pmatrix} 10 & 3 \\ 6 & 5 \end{pmatrix}$$

- 26) In the figure, AD is the bisector of $\angle BAC$, if $AB = 10$ cm, $AC = 14$ cm and $BC = 6$ cm. Find BD and DC .



- 27) The standard deviation and mean of a data are 6.5 and 12.5 respectively. Find the co-efficient of variation.
 28) Define: Co-prime numbers. If a and 24 are co-prime numbers, find all values of a .

PART - III

Note: I) Answer 10 questions. II) Question Number 42 is compulsory. $10 \times 5 = 50$

- 29) The function 't' which maps temperature in Celsius (C) into temperature (F) is defined by $t(C) = F$, where $F = \frac{9}{5}C + 32$. Find

(i) $t(0)$ (ii) $t(28)$ (iii) $t(-10)$ (iv) the value of C when $t(C) = 212$,
 (v) the temperature when the Celsius value is equal to the Fahrenheit value.

- 30) For the functions, $f(x) = x^2 + 4$, $g(x) = 3x + 5$ and $h(x) = x - 5$ verify that $(f \circ g) \circ h = f \circ (g \circ h)$.
 31) Find the sum of the series $(2^3 - 1^3) + (4^3 - 3^3) + (6^3 - 5^3) + \dots$ to (i) n terms (ii) 8 terms.

32) If $A = \begin{pmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{pmatrix}$, show that $(AB)^T = B^T A^T$.

- 33) A pole has to be erected at a point on the boundary of a circular ground of diameter 20m in such a way that the difference of its distances from two diametrically opposite fixed gates P and Q on the boundary is 4m. Is it possible to do so? If answer is yes at what distance from the two gates should the pole be erected?

- 34) The perpendicular PS on the base QR of a ΔPQR intersects QR at S, such that $QS = 3SR$. Prove that $2PQ^2 = 2PR^2 + QR^2$.

- 35) Find the area of the quadrilateral whose vertices are $(-9, 0)$, $(-8, 6)$, $(-1, -2)$ and $(-6, -3)$.

- 36) From a window (h metres high above the ground) of a house in a street, the angles of elevation and depression of the top and the foot of another house of the opposite side of the street are θ_1 and θ_2 respectively. Show that the height of the opposite house is $h \left(1 + \frac{\cot \theta_2}{\cot \theta_1} \right)$.

- 37) Arul has to make arrangements for the accommodation of 150 persons for his family function. For this purpose, he plans to build a tent which is in the shape of cylinder surmounted by a cone. Each person occupies 4 sq.m of the space on ground and 40 cu.meter of air to breathe. What should be the height of the conical part of the tent if the height of cylindrical part is 8m?

- 38) A card is drawn from a pack of 52 cards. Find the probability of getting a king or a heart or a red card.

- 39) If $S_n = (x+y) + (x^2+xy+y^2) + (x^3+x^2y+xy^2+y^3) + \dots$ n terms then prove that

$$(x-y)S_n = \left[\frac{x^2(x^n-1)}{x-1} - \frac{y^2(y^n-1)}{y-1} \right]$$

- 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) Water is flowing at the rate of 15 km per hour through a pipe of diameter 14 cm into a rectangular tank which is 50m long and 44m wide. Find the time in which the level of water in the tanks will rise by 21 cm?

- 42) Find the square root of the following polynomial:

$$(\sqrt{15}x^2 + (\sqrt{3} + \sqrt{10})x + \sqrt{2})(\sqrt{5}x^2 + (2\sqrt{5} + 1)x + 2)(\sqrt{3}x^2 + (\sqrt{2} + 2\sqrt{3})x + 2\sqrt{2})$$

PART - IV

Note: I) This section contains two questions. Each with two alternatives. $2 \times 8 = 16$
 II) Answer both the questions choosing either of the alternatives.

- 43) A) Draw a triangle ABC of base $BC = 8$ cm, $\angle A = 60^\circ$ and the bisector of $\angle A$ meets BC at D such that $BD = 6$ cm. (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) Discuss the nature of solutions of the quadratic equation graphically. $(2x-3)(x+2) = 0$ (OR)

B) Draw the graph of $y = 2x^2 - 3x - 5$ and hence solve $2x^2 - 4x - 6 = 0$.