

Topics : Fundamentals of Mathematics, Circle, Quadratic Equation, Determinants

Type of Questions

M.M., Min.

Single choice Objective (no negative marking) Q. 1, 2, 3 (3 marks, 3 min.) [9, 9]

Short Subjective Questions (no negative marking) Q. 4, 5, 6, 7, 8 (3 marks, 3 min.) [15, 15]

- The integral values of x for which $x^2 + 7x + 13$ is perfect square are
(A) $-4, 5, 2$ (B) $-3, -2$ (C) $-4, -3, -2$ (D) $-4, -3$
- Two equal circles of radius R are touching each other externally . If a smaller circle of radius ' r ' is touching both of these circles as well as their direct common tangent , then the ratio $r : R$ is :
(A) $1 : \sqrt{2}$ (B) $1 : 2$ (C) $1 : 2\sqrt{2}$ (D) $1 : 4$
- If the equation $\sin^4 x - (k + 2)\sin^2 x - (k + 3) = 0$ has a solution then k must lie in the interval :
(A) $(-4, -2)$ (B) $[-3, 2)$ (C) $(-4, -3)$ (D) $[-3, -2]$
- Show that $x^4 + 4$ is prime for only one value of $x \in \mathbb{N}$
- Find the range of values of x for which the equaiton $[x]^2 + \lceil x \rceil^2 = 13$ holds true.
(Here $[x]$ denotes the greatest integer just less than or equal to x and $\lceil x \rceil$ denotes the least integer just greater than or equal to x)
- Find the locus of the middle points of chords of the circle $x^2 + y^2 = a^2$ which subtend a right angle at the point $(c, 0)$.
- Show that $\Delta = \begin{vmatrix} b^2 + c^2 & ab & ac \\ ab & c^2 + a^2 & bc \\ ca & cb & a^2 + b^2 \end{vmatrix} = 4a^2b^2c^2$
- Prove that $\begin{vmatrix} -bc & b^2 + bc & c^2 + bc \\ a^2 + ac & -ac & c^2 + ac \\ a^2 + ab & b^2 + ab & -ab \end{vmatrix} = (ab + bc + ca)^3$.

Answers Key

1. (D)

2. (D)

3. (D)

5. $x \in (-3, -2) \cup (2, 3)$

6. $2x^2 + 2y^2 - 2cx + c^2 - a^2 = 0$