

Time: 3.00 Hours

Standard 10 MATHEMATICS Part - A

Marks: 100

14x1=14

Note : i) Answer all the questions.

ii) Choose the most suitable answer from the four given alternatives and write the correct option.

- 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 $f: A \rightarrow B$ is a bijective function and if $n(B) = 7$, then $n(A)$ is equal to
a) 7 b) 49 c) 1 d) 14
- Is composition of three functions associative?
a) Sometimes true b) Always true c) Never true d) Not defined
- If the HCF of 65 and 117 is expressible in the form of $65m - 117$, then the value of 'm' is
a) 4 b) 2 c) 1 d) 3
- The value of $(1^3 + 2^3 + 3^3 + \dots + 15^3) - (1 + 2 + 3 + \dots + 15)$ is
a) 14400 b) 14200 c) 14280 d) 14520
- The sequence $\sqrt{1}, \sqrt{55}, \sqrt{11}, \sqrt{55}, 2\sqrt{11}, \dots$ is
a) A.P b) G.P c) both A.P and G.P d) neither A.P nor G.P
- $Y^2 + \frac{1}{Y}$ is not equal to
a) $\frac{Y^4 + 1}{Y^2}$ b) $\left(Y + \frac{1}{Y}\right)^2$ c) $\left(Y - \frac{1}{Y}\right)^2 + 2$ d) $\left(Y + \frac{1}{Y}\right)^2 - 2$
- which of the following should be added to make $x^4 + 64$ a perfect square
a) $4x^2$ b) $16x^2$ c) $8x^2$ d) $-8x^2$
- The number of excluded values of $\frac{x^3 + x^2 - 10x + 8}{x^4 + 8x^2 - 9}$ is
a) 2 b) 1 c) 3 d) 4
- If $\triangle ABC$ is an isosceles triangle with $\angle C = 90^\circ$ and $AC = 5\text{cm}$, then AB is
a) 2.5 cm b) 5cm c) 10 cm d) $5\sqrt{2}$ cm
- In $\triangle ABC$, $DE \parallel BC$, $AB = 3.6\text{cm}$, $AC = 2.4\text{cm}$ and $AD = 2.1\text{cm}$ then the length of AE is
a) 1.4 cm b) 1.8cm c) 1.2cm d) 1.05cm
- If $(5, 7)$, $(3, P)$ and $(6, 6)$ are collinear, then the value of 'P' is
a) 3 b) 6 c) 9 d) 12
- If slope of the line PQ is $\frac{1}{\sqrt{3}}$ then slope of the perpendicular bisector of PQ is
a) $\sqrt{3}$ b) $-\sqrt{3}$ c) $\frac{1}{\sqrt{3}}$ d) 0
- $\tan \theta \operatorname{Cosec}^2 \theta - \tan \theta$ is equal to
a) $\sec \theta$ b) $\cot^2 \theta$ c) $\sin \theta$ d) $\cot \theta$

Part - B**II. Do any 10 sums: (Q.No: 28 is compulsory)**

10x2=20

- If $A = \{1, 3, 5\}$ and $B = \{2, 3\}$ then find $n(A \times B)$ and $n(B \times A)$.
- Let $f(x) = 2x + 5$. If $x \neq 0$ then find $\frac{f(x+2) - f(2)}{x}$
- Let $f(x) = x^2 - 1$. Find $f \circ f$.
- Find the least number that is divisible by the first ten natural numbers.
- Find the indicated terms whose n^{th} term is given by $a_n = -(n^2 - 4)$; a_4 and a_{11} .
- Find the sum $3 + 1 + \frac{1}{3} + \dots$
- Find the excluded value in the expression $\frac{y}{y^2 - 25}$
- Determine the nature of roots of the quadratic equation $9x^2 - 24x + 16 = 0$

- 23) If $\triangle ABC$ is similar to $\triangle DEF$ such that $BC = 3\text{cm}$, $EF = 4\text{cm}$ and area of triangle $ABC = 54\text{cm}^2$. Find the area of $\triangle DEF$.
- 24) In $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. In it if $\frac{AD}{DB} = \frac{3}{4}$ and $AC = 15\text{cm}$ find AE.
- 25) Find the intercepts made by the line $4x - 9y + 36 = 0$ on the coordinate axes.
- 26) Find the slope of a line joining the points $(5, 5)$ with the origin.
- 27) Prove that $\sqrt{\frac{1 + \cos \theta}{1 - \cos \theta}} = \text{Cosec } \theta + \cot \theta$
- 28) If $1^3 + 2^3 + 3^3 + \dots + K^3 = 44100$ then find $1 + 2 + 3 + \dots + K$

Part - C

III. Answer any 10 questions. (Q.No: 42 is compulsory).

10x5=50

- 29) Let A = The set of all natural numbers less than 8
B = The set of all prime numbers less than 8
C = The set of even Prime number. Verify that $(A \cap B) \times C = (A \times C) \cap (B \times C)$
- 30) Let $f: A \rightarrow B$ be a function defined by $f(x) = \frac{x}{2} - 1$, where $A = \{2, 4, 6, 10, 12\}$
 $B = \{0, 1, 2, 4, 5, 9\}$. Represent f by
i) Set of ordered pairs ii) a table
iii) An arrow diagram iv) a graph
- 31) If $f(x) = 2x + 3$, $g(x) = 1 - 2x$ and $h(x) = 3x$. Prove that $fo(goh) = (fog)oh$
- 32) The sum of three consecutive terms that are in AP is 27 and their product is 288. Find the three terms.
- 33) The sum of first n, 2n and 3n terms of an A.P are S_1 , S_2 and S_3 respectively. Prove that $S_3 = 3(S_2 - S_1)$
- 34) Find the sum to n terms of the series $7 + 77 + 777 + \dots$
- 35) Find the G.C.D of $6x^3 - 30x^2 + 60x - 48$ and $3x^3 - 12x^2 + 21x - 18$
- 36) Find the values of m and n if the polynomial $36x^4 - 60x^3 + 61x^2 - mx + n$ is a perfect square.
- 37) State and demonstrate Basic proportionality theorem.
- 38) Find the area of the quadrilateral formed by the points (8, 6) (5, 11) (-5, 12) and (-4, 3)
- 39) If the points A(2, 2) B(-2, -3) C(1, -3) and D(x, y) form a parallelogram then find the value of x and y.
- 40) Find the equation of a straight line through the intersection of lines $7x + 3y = 10$, $5x - 4y = 1$ and Parallel to the line $13x + 5y + 12 = 0$.
- 41) If $\frac{\cos \alpha}{\cos \beta} = m$ and $\frac{\cos \alpha}{\sin \beta} = n$, then Prove that $(m^2 + n^2) \cos^2 \beta = n^2$.
- 42) Solve : $pqx^2 - (p + q)^2x + (p + q)^2 = 0$

Part - D

IV. Answer both the questions by choosing either of the alternatives. 2x8=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) Construct a $\triangle ABC$ such that $AB = 5.5\text{cm}$, $\angle C = 25^\circ$ and the altitude from C to AB is 4cm.
- 44) a) A bus is travelling at a uniform speed of 50 km/hr. Draw the distance - time graph and hence find
i) the constant of variation
ii) how far will it travel in 90 minutes?
iii) the time required to cover a distance of 300 km from the graph.
(OR)
b) Draw the graph of $xy = 24$, $x, y > 0$. Using the graph find,
i) y when $x = 3$ and ii) x when $y = 6$