



Standard 10

MATHEMATICS

PART - I

Time: 3.00 Hours

Marks: 100

I. Choose the correct answer:

14x1=14

- 1) $A = \{a, b, p\}$, $B = \{2, 3\}$, $C = \{p, q, r, s\}$, then $n[(A \cup C) \times B]$ is
 - a) 8
 - b) 20
 - c) 12
 - d) 16
- 2) 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
- 3) If $g = \{(1,1), (2, 3), (3, 5), (4, 7)\}$ is a function given by $g(x) = \alpha x + \beta$ then the value of α and β are
 - a) $(-1, 2)$
 - b) $(2, -1)$
 - c) $(-1, -2)$
 - d) $(1, 2)$
- 4) Using Euclid's division lemma, if the cube of any positive integer is divided by 9 then the possible remainders are
 - a) 0, 1, 8
 - b) 1, 4, 8
 - c) 0, 1, 3
 - d) 1, 3, 5
- 5) $7^{4k} \equiv \dots \pmod{100}$
 - a) 1
 - b) 2
 - c) 3
 - d) 4
- 6) 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
- 7) If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is
 - a) 3
 - b) 5
 - c) 6
 - d) 8
- 8) $y^2 + \frac{1}{y^2}$ 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) $\left(y + \frac{1}{y}\right)^2 - 2$
- 9) Which of the following should be added to make $x^2 + 64$ a perfect square
 - a) $4x^2$
 - b) $16x^2$
 - c) $8x^2$
 - d) $-8x^2$
- 10) If in triangles ABC and EDF , $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar,
 - a) $\angle B = \angle E$
 - b) $\angle A = \angle D$
 - c) $\angle B = \angle D$
 - d) $\angle A = \angle F$
- 11) If 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) 1.4cm
 - b) 1.8cm
 - c) 1.2cm
 - d) 1.05cm
- 12) The slope of the line which is perpendicular to a line joining the points $(0, 0)$ and $(-8, 8)$ is
 - a) -1
 - b) 1
 - c) $\frac{1}{3}$
 - d) -8

- 13) A straight line has equation $8y = 4x + 21$. Which of the following is true
- The slope is 0.5 and the y intercept is 2.6
 - The slope is 5 and the y intercept is 1.6
 - The slope is 0.5 and the y intercept is 1.6
 - The slope is 5 and the y intercept is 2.6
- 14) If $\sin \theta + \cos \theta = a$ and $\sec \theta + \operatorname{cosec} \theta = b$, then the value of $b(a^2 - 1)$ is equal to
- 2a
 - 3a
 - 0
 - 2ab

PART - II

II. Answer any 10 questions. Question No. 28 is compulsory: $10 \times 2 = 20$

- 15) Let $A = \{1, 2, 3\}$ and $B = \{x/x \text{ is a prime number less than } 10\}$ Find $A \times B$ and $B \times A$.
- 16) Find K if $f \circ f(k) = 5$ where $f(k) = 2k - 1$.
- 17) Let $A = \{1, 2, 3\}$, $B = \{4, 5, 6, 7\}$ and $f = \{(1, 4), (2, 5), (3, 6)\}$ be a function from A to B . Show that f is one - one but not onto function.
- 18) Prove that two consecutive positive integers are always coprime.
- 19) Find the number of integer solutions of $3x \equiv 1 \pmod{15}$
- 20) Find the sum $3 + 1 + \frac{1}{3} + \dots \infty$
- 21) Find the excluded values of the following Expression (if any): $\frac{7p + 2}{8p^2 + 13p + 5}$
- 22) Determine the nature of the roots for the following quadratic equation:
 $15x^2 + 11x + 2 = 0$
- 23) In $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $\frac{AD}{DB} = \frac{3}{4}$ and $AC = 15$ cm find AE .
- 24) A man goes 18m due east and then 24 m due north. Find the distance of his current position from the starting point?
- 25) Find the slope of a line joining the points $(5, \sqrt{5})$ with the origin
- 26) If the straight lines $12y = -(p + 3)x + 12$, $12x - 7y = 16$ are perpendicular then find 'p'.
- 27) Prove that $\tan^2 \theta - \sin^2 \theta = \tan^2 \theta \sin^2 \theta$
- 28) Find the equation of a straight line which is parallel to the line $3x - 7y = 12$ and passing through the point $(6, 4)$.

PART - III

III. Answer any 10 questions. Question No. 42 is compulsory: $10 \times 5 = 50$

- 29) Let $A = \{x \in W / x < 2\}$, $B = \{x \in N / 1 < x \leq 4\}$ and $C = \{3, 5\}$. Verify that
 $A \times (B \cup C) = (A \times B) \cup (A \times C)$
- 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
- set of ordered pairs
 - a table
 - an arrow diagram
 - a graph.

- 31) Show that $(f \circ g) \circ h = f \circ (g \circ h)$ if $f(x) = x - 1$, $g(x) = 3x + 1$ and $h(x) = x^3$.
- 32) In an A.P, sum of four consecutive terms is 28 and the sum of their squares is 276. Find the four numbers.
- 33) Find the sum of n terms of the series $3 + 33 + 333 + \dots$ to n terms
- 34) Solve $3x + y - 3z = 1$; $-2x - y + 2z = 1$; $-x - y + z = 2$.
- 35) Find the square root of the polynomial by division method $121x^4 - 198x^3 - 183x^2 + 216x + 144$.
- 36) If the roots of the equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + b^2 - ac = 0$ are real and equal. Prove that either $a = 0$ (or) $a^3 + b^3 + c^3 = 3abc$.
- 37) State and prove Thales theorem.
- 38) Rhombus PQRB is inscribed in $\triangle ABC$ such that $\angle B$ is one of its angle. P, Q and R lie on AB, AC and BC respectively. If $AB = 12\text{cm}$ and $BC = 6\text{cm}$, find the sides PQ, RB of the Rhombus.
- 39) Find the area of the quadrilateral formed by the points $(8, 6)$, $(5, 11)$, $(-5, 12)$ and $(-4, 3)$.
- 40) Find the equation of a straight line through the intersection of the lines $7x - 3y = -12$ and $2y = x + 3$ also parallel to $x - y$ axis.
- 41) A mobile phone is put to use when the battery power is 100%. The percent of battery power 'y' (in decimal) remaining after using the mobile phone for x hours is assumed as $y = 0.25x + 1$.
- Find the number of hours elapsed if the battery power is 40%
 - How much time does it take so that the battery has no power?
- 42) The sum of first n , $2n$ and $3n$ terms of an A.P. are S_1 , S_2 and S_3 respectively. Prove that $S_3 = 3(S_2 - S_1)$.

PART - IV

IV. Answer all the questions:

2x8=16

- 43) a) Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{2}{3}$ of the corresponding sides of the triangle PQR (Scale factor $\frac{2}{3} < 1$)

(OR)

- b) Construct a triangle $\triangle PQR$ such that $QR = 5\text{cm}$, $\angle P = 30^\circ$ and the altitude from P to QR is of length 4.2 cm.
- 44) a) A company initially started with 40 workers to complete the work by 150 days. Later it decided to fasten up the work increasing the number of workers as shown below.

Number of workers (x)	40	50	60	75
Number of days (y)	150	120	100	80

- Graph the above data and identify the type of variation
- From the graph, find the number of days required to complete the work if the company decides to opt for 120 workers?
- If the work has to be completed by 200 days, how many workers are required?

(OR)

- b) Draw the graph of $xy = 24$, $x, y > 0$. Using the graph find (i) y when $x = 3$ and (ii) x when $y = 6$.