

PART - I

14 X 1 = 14

Answer all the questions.

(Choose the correct answer from the given four alternatives and write with the option code)

- If the ordered pairs $(a + 2, 4)$ and $(5, 2a + b)$ are equal then (a, b) is
a) $(2, -2)$ b) $(5, 1)$ c) $(2, 3)$ d) $(3, -2)$
- Module's function is
a) A linear function b) A constant function
c) A composition of two linear functions d) A quadratic function
- The sum of the exponents of the prime factors in the prime factorization of 1729 is
a) 1 b) 2 c) 3 d) 4
- 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 excluded values of the rational expression $\frac{x^2 - 5x + 4}{x^2 + x - 2}$ is
a) 1, -2 b) 1 c) -2 d) -1, 2
- The square root of $\frac{256x^3y^4z^{18}}{25x^6y^8z^8}$ is equal to
a) $\frac{16}{5} \left| \frac{x^2z^4}{y^2} \right|$ b) $16 \left| \frac{y^2}{x^2z^4} \right|$ c) $\frac{16}{5} \left| \frac{y^2}{xz^2} \right|$ d) $\frac{16}{5} \left| \frac{xz^2}{y} \right|$
- If number of columns and rows are not equal in a matrix then it is said to be a
a) diagonal matrix b) rectangular matrix c) square matrix d) Identity matrix
- If $\triangle ABC$ is an isosceles triangle with $\angle C = 90^\circ$ and $AC = 5$, then AB is
a) 2.5 cm b) 5 cm c) 10 cm d) $5\sqrt{2}$ cm
- If $2C + 10 = 0$, then the line $x = c$ lies
a) Left side of the X axis b) Left side of the Y axis
c) right side of the X axis d) right side of the Y axis
- The equation of the line passing through the origin and perpendicular to the line $7x - 3y + 4 = 0$ is
a) $7x - 3y + 4 = 0$ b) $3x - 7y + 4 = 0$ c) $3x + 7y = 0$ d) $7x - 3y = 0$
- 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) $\frac{-2}{3}$
- The radii of a cone and a sphere are equal. If the height of the cone is twice as its radius then the ratio of the C.S.As of the sphere and cone is
a) $4 : \sqrt{5}$ b) $\sqrt{5} : 4$ c) $\sqrt{5} : 3$ d) $3 : \sqrt{5}$
- Variance of first 20 natural number is
a) 32.25 b) 44.25 c) 33.25 d) 30
- Which of the following is incorrect?
a) $P(A) > 1$ b) $0 \leq P(A) \leq 1$ c) $P(\phi) = 0$ d) $P(A) + P(\bar{A}) = 1$

PART - II

Answer 10 questions. (Question No. 28 is compulsory)

10 X 2 = 20

- Let $f = \{(-1, 3), (0, -1), (2, -9)\}$ be a linear function from Z into z, find $f(x)$.
- Find the sum $3 + 1 + \frac{1}{3} + \dots + \infty$.
- Use Euclid's Division Algorithm to find H.C.F. of 340 and 412.
- If $A = \begin{pmatrix} 1 & 2 & 0 \\ 3 & 1 & 5 \end{pmatrix}$, $B = \begin{pmatrix} 8 & 3 & 1 \\ 2 & 4 & 1 \\ 5 & 3 & 1 \end{pmatrix}$, then find AB .

19. Determine the nature of roots of the quadratic equations $9x^2 - 24x + 16 = 0$.
20. Find the G.C.D. of $5m + 20$, $10m^2 + 35m - 20$.
21. 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.
22. If the area of the triangle formed by the vertices A (-1, 2), B (K, -2) and C (7, 4) (taken in order) is 22sq. units, find the value of K.
23. Prove that $\tan^2 \theta - \sin^2 \theta = \tan^2 \theta \cdot \sin^2 \theta$.
24. From the top of a rock $50\sqrt{3}$ m high, the angle of depression of a car on the ground is observed to be 30° . Find the distance of the car from the rock.
25. Find the range and coefficient of range of the following data : 25, 67, 48, 53, 18, 39, 44.
26. If the base area and the total surface area of a cylinder are 154sq.cm and 748 sq.cm respectively, then find the C.S.A. of the cylinder.
27. The radius and height of a cylinder are in the ratio 5 : 7 and its curved surface area is 5500 sq.cm. Find its radius and height.
28. Two dice are rolled. Find the probability of getting prime numbers on both dices.

PART - III

Answer 10 questions. (Question No. 42 is compulsory)

10 X 5 = 50

29. A function f is defined by $f(x) = 2x - 3$. i) find $\frac{f(0) + f(1)}{2}$ ii) find x such that $f(x) = 0$.
iii) find x such that $f(x) = x$ iv) find x such that $f(x) = f(1 - x)$
30. Let A = {1, 2, 3, 4} and B = {2, 5, 8, 11, 14} be two sets. Let $f : A \rightarrow B$ be a function given by $f(x) = 3x - 1$. Represent this function.
i) by arrow diagram ii) in a table form iii) as a set of ordered pairs iv) in a graphical form
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. Simplify : $\frac{1}{x^2 - 5x + 6} + \frac{1}{x^2 - 3x + 2} - \frac{1}{x^2 - 8x + 15}$.
33. Find the values of m and n if $x^4 - 8x^3 + mx^2 + nx + 16$ is a perfect squares.
34. If $A = \begin{pmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{pmatrix}$, $B = \begin{bmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{bmatrix}$ verify that $(AB)^T = B^T \cdot A^T$.
35. Write and prove Angle Bisector theorem.
36. Let A (3, -4), B (9, -4), C (5, -7) and D (7, -7). Show that ABCD is a trapezium.
37. If the line joining the points (-1, -4) and (3, 4) is a tangent to the circle whose center is at origin then find the point of contact of the tangent.
38. From the top of a 12m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 30° . Determine the height of the tower.
39. Find the volume of the double cone which is formed when the right angled triangle with sides 3cm, 4cm and 5cm is revolved about its hypotenuse.
40. The marks scored by 10 students in a class test 25, 29, 30, 33, 35, 37, 38, 40, 44, 48. Find the standard deviation.
41. Two dice are rolled together. Find the probability of getting a doublet or sum of faces as 4.
42. If $A = 2^{-1}$, $B = 2^{14} + 2^{13} + \dots + 2^1 + 2^0$ and $C = 2^{14} + 2^{13} + \dots + 2^2 + 2^1$ then prove that $2A = B + C + 3$.

PART - IV

Answer all the questions.

2 X 8 = 16

43. a) Construct a $\triangle PQR$ in which $\angle Q = 80^\circ$, $\angle R = 60^\circ$ and the median RG from R to PQ is 5.8cm. Find the length of the altitude from R to PQ. (OR)
b) Draw the two tangents from a point which is 5cm away from the centre of a circle of diameter 6cm. Also, measure the lengths of the tangents.
44. a) Graph the following quadratic equation $(2x - 3)(x + 2) = 0$ and state its nature of solutions. (OR)
b) Draw the graph of $y = x^2 - 4x + 3$ and use it to solve $x^2 - 6x + 9 = 0$.