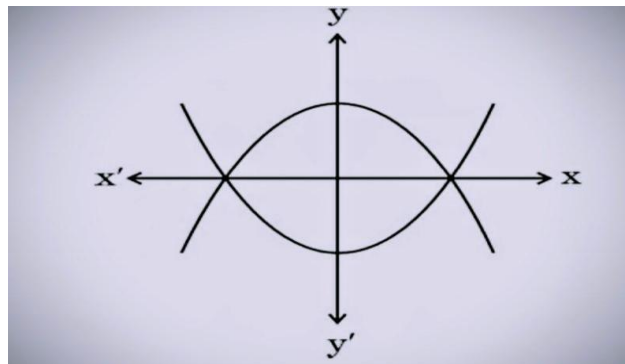


Note: All questions are compulsory.

Section - A (each Question carry 01 mark)

- (1) If $HCF(98, 28) = m$ and $LCM(98, 28) = n$, then the value of $(n - 7m)$ is
 (a) 0 (b) 28 (c) 98 (d) 198
- (2) If p and q are positive integers such that $p = ab^2$ $q = a^3b$ where a, b are prime numbers, then $HCF(p, q) =$
 (a) ab (b) a^2b^2 (c) a^3b^2 (d) a^3b^3
- (3) The distance between $A(7, 3)$ and $B(2, 3)$ is :
 (a) 5 (b) 6 (c) 7 (d) 8
- (4) The points $A(9, 0)$, $B(9, 6)$, $C(-9, 6)$ and $D(-9, 0)$ are the vertices of a:
 (a) Square (b) Rectangle (c) Rhombus (d) Trapezium
- (5) The pair of linear equations $2kx + 5y = 7$ and $6x - 5y = 11$ has a unique solution, if :
 (a) $k = -3$ (b) $k = 2/3$ (c) $k =$ (d) $k = 2/9$
- (6) If $P(x) = x^2 - 25$, then the zeroes are
 (a) only $+5$ (b) only -5 (c) $+5$ and -5 both (d) None of these
- (7) If $x = 1$ and $y = 2$ is a solution of the pair of linear equations $2x + 3y + a = 0$ and $2x + 3y + b = 0$, then :
 (a) $a = 2b$ (b) $2a = b$ (c) $a + 2b = 0$ (d) $2a + b = 0$
- (8) The discriminant of the quadratic equation $x^2 - 6x + 5 = 0$ is
 (a) 8 (b) 16 (c) 100 (d) 64
- (9) The equation $x + 1/x = 3$ ($x \neq 0$) is expressed as a quadratic equation in the form of $ax^2 + bx + c = 0$. The value of $a + b + c$ is :
 (a) 5. (b) 2 (c) -1 (d) 1
- (10) If α and β are the zeros of a polynomial. If $f(x) = px^2 - 6x + 3p$ and $\alpha + \beta = \alpha\beta$, then p is
 (a) 2 (b) $2/3$ (c) $1/3$ (d) -2
- (11) Two polynomials are shown in the graph below. The number of distinct zeroes of both the polynomials is :



- (a) 3 (b) 5 (c) 2 (d) 4

(12) If $\sec A = 25/7$, the $(\sin A + \cos A)$ is:

- (a) 1 (b) -1 (c) 2 (d) None of these

(13) The value of $(\tan^2 B - \sec^2 B)$ is

- (a) (1) (b) (-4) (c) (-1) (d) Can't be determined.

(14) If $(\tan A + \cot A) = 5$, then value of $(\tan^2 A + \cot^2 A)$ is:

- a) 1 b) 7 c) 25 d) 23

(15) Match the column :

Column I	Column II
1. $\frac{\text{Side opposite to angle A}}{\text{Hypotenuse}}$	A. $\tan A$
2. $\frac{\text{Side adjacent to angle A}}{\text{Hypotenuse}}$	B. $\sin A$
3. $\frac{\text{Side opposite to angle A}}{\text{Side adjacent to angle A}}$	C. $\cos A$
	D. $\sec A$

- a) 1-A,2-C,3-B b) 1-B,2-C,3-A c) 1-B,2-C,3-D d) 1-D,2-B,3-A

(16) If the sum of first m terms of an AP is $2m^2 + 3m$, then its second term is :

- (A) 10 (B) 9 (C) 14 (D) none of these

(17) The number of terms in the sequence 3,6,9,12.....111 is:

- (a) 36 (b) 38 (c) 28 (d) 37

(18) The 21th term of an AP whose first term and common difference are -3 and 7, is

- (a) 17 (b) 137 (c) 143 (d) 143

(19) Assertion (A): Zeroes of a polynomial $p(x) = x^2 - 2x - 3$ are -1 and 3.

Reason (R): The graph of polynomial $p(x) = x^2 - 2x - 3$ intersects the x-axis at (-1, 0) and (3, 0).

- a) Both A and R are true, and R is the correct explanation of A.
b) Both A and R are true, but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

(20) Assertion A : Sum of first 10 terms of the arithmetic progression -0.5, -1.0, -1.5..... is 31.

Reasons(R) : Sum of n terms of an AP is given as $S = n/2 [2a + (n-1)d]$, where a is first term and d is a common difference.

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

Section - B (each question carries 02 marks)

(21) Prove that $6 - \sqrt{7}$ is an irrational number.

(22) Show that the number $5 \times 11 \times 17 + 3 \times 11$ is a composite number.

OR

Show that any number of the form 6^n , where $n \in \mathbb{N}$ can never end with digit 0.

(23) Find the zeroes of the quadratic polynomial $p(x) = x^2 + 7x + 10$, and verify the relationship between the zeroes and the coefficients.

Section - C (Each question carries 3 marks)

(24) Find the ratio in which the X axis divides the line segment joining the points (-2, 3) and (6, -7).

(25) if $\tan(A+B) = \sqrt{3}$, $\tan(A-B) = \frac{1}{\sqrt{3}}$ whose $0^\circ < A+B < 90^\circ$, $A > B$, find A and B.

OR

if $\tan \theta = \frac{3}{4}$ evaluate $\frac{3 \sin \theta + 4 \cos \theta}{2 \sin \theta - 5 \cos \theta}$

(26) Ten years ago, father was twelve times as old as his son and ten years hence, he will be twice as old as his son find their present ages.

OR

The ratio of incomes of two persons is 9:7 and the ratio of their expenditures is 4:3. If each of them saves Rs. 200 per month, find their monthly income.

(27) Find the quadratic polynomial, sum and product of whose zeroes are -1 and -20 respectively. Also, find the zeroes of the polynomial so obtained.

(28) A rectangular park is to be designed whose breadth is 3 m less than its length. Its area is to be 4 square metres more than the area of a park that has already been made in the shape of an isosceles triangle with its base as the breadth of the rectangular park and of altitude 12 m. Find the length and breadth of the rectangular park.

OR

Solve for x: $\frac{1}{x} + \frac{2}{2x-3} = \frac{1}{x-2}$ $x = 0, \frac{3}{2}, 2$.

(29) Prove that the points (3, 0), (6, 4) and (-1, 3) are the vertices of a right angled isosceles triangle.

(30) Rohan repays his total loan of 1,18,000 by paying every month starting with the first instalment of 1,000. If he increases the instalment by 100 every month, what amount will be paid by him in the 30th instalment? What amount of loan has he paid after the 30th installment?

(31) Evaluate:-

- $2(\cos^2 45^\circ + \tan^2 60^\circ) - 6(\sin^2 45^\circ - \tan^2 30^\circ)$
- $(\sin^2 50^\circ + \cos^2 50^\circ) / \tan^2 60^\circ$

Section - D (each question carries 5 marks)

(32) (i) Find the ratio in which the point $(-4,6)$ divides the line segment joining the points A $(-6,10)$ and B $(3,-8)$.

(ii) If (a,b) is the mid-point of the line segment joining the points A $(10,-6)$, B $(k,4)$ and $a-2b=18$, find the value of k and distance AB.

(33) The speed of a boat in still water is 15km/hr . It can go 30km upstream and return downstream in 4.5 hours. Find the speed of the stream.

OR

A train travels a distance of 300 km at constant speed. If the speed of the train is increased by 5 km an hour, the journey would have taken 2 hours less. Find the original speed of the train.

(34) (i) Find the value of m and n for which the following system of linear equations has infinite solutions:

$$(2m-1)x + 3y - 5 = 0$$

$$3x + (n-1)y - 2 = 0$$

(ii) The denominator of a fraction is 4 more than twice the numerator. When both the numerator and denominator are decreased by 6 , then the denominator becomes 12 times the numerator. Determine the fraction.

(35) Prove that :

$$\frac{\cos^2\theta}{1-\tan\theta} + \frac{\sin^3\theta}{\sin\theta - \cos\theta} = 1 + \sin\theta \cdot \cos\theta$$

OR

$$\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \tan\theta + \cot\theta$$

Section - E (each question carries 4 marks)

Case Study 1

Your younger sister wants to buy an electric car and plans to take a loan from a bank for her electric car. She repays her total loan of Rs 321600 by paying every month starting with the first instalment of Rs 2000 and it increases the instalment by Rs 200 every month.

Based on the above information, solve the following questions:

Q1. Find the list of the instalment formed by the given statement.

- a. $2000, 1800, 1600, \dots$
- b. $2000, 2200, 2400, \dots$
- c. $2200, 2400, 2600, \dots$
- d. $2300, 2600, 2900, \dots$

Q 2. The amount paid by her in 25th instalment is:

- a. 6800
- b. 3500
- c. 4800
- d. 6600

Q3. Find the difference of the amount in the 4th and 6th instalment paid by the younger sister.

- a. Rs200 b. Rs400 c. Rs600. d. Rs800

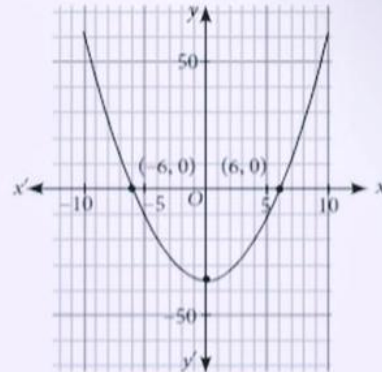
Q4. In how many installments, she cleared her total bank loan?

- a. 1582 b. 1580 c. 1599. d. 1600

Q5. Find the sum of the first seven installments. a. 14000 b. 13600 c. 10400 d. 12600

Case Study 2

While playing in garden, Sahiba saw a honeycomb and asked her mother what is that. She replied that it's a honeycomb made by honey bees to store honey. Also, she told her that the shape of the honeycomb formed is parabolic. The mathematical representation of the honeycomb structure is shown in the graph.



Based on the above information, answer the following questions.

- (i) Graph of a quadratic polynomial is _____ in shape.
 - (a) straight line
 - (b) parabolic
 - (c) circular
 - (d) None of these
- (ii) The expression of the polynomial represented by the graph is
 - (a) $x^2 - 49$
 - (b) $x^2 - 64$
 - (c) $x^2 - 36$
 - (d) $x^2 - 81$
- (iii) Find the value of the polynomial represented by the graph when $x = 6$.
 - (a) -2
 - (b) -1
 - (c) 0
 - (d) 1
- (iv) The sum of zeroes of the polynomial $x^2 + 2x - 3$ is
 - (a) -1
 - (b) -2
 - (c) 2
 - (d) 1
- (v) If the sum of zeroes of polynomial $at^2 + 5t + 3a$ is equal to their product, then find the value of a .
 - (a) -5
 - (b) -3
 - (c) $\frac{5}{3}$
 - (d) $\frac{-5}{3}$

Case Study 3