X – MATHS

IMPORTANT 2 MARK AND 5 MARK QUESTIONS

PREPARED BY

Mr. M. GANESAN. M.Sc., B.Ed., PGDCA.,

KEERANUR / PUDUKKOTTAI DISTRICT.

9159616970.

1. RELATIONS AND FUCTION

2 Marks:

1. If A={1,3,5} and B={2,3} then (i) find $A \times B$ and $B \times A$ (ii) Is $A \times B = B \times A$? If not why? (iii) Show that $n(A \times B) = n(A) \times n(B)$.
2. If $A \times B = \{(3,2),(3,4),(5,2),(5,4)\}$ then find A and B.
3. Find $A \times B, A \times A\ and\ B \times A$

   (i) $A = \{2,-2,3\}\ and\ B = \{1,-4\}$ $(ii)\ A = \{m,n\}\ and\ B = \emptyset$
4. Let $X = \{1,2,3,4\}$ and $Y = \{2,4,6,810\}$ and $R = \{(1,2),(2,4),(3,6),(4,8)\}$ Show that R is a function and find its domain, co-domain and range?
5. A relation R is given by the set $\{(x,y)/y = x + 3, x = \{0,1,2,3,4,5,\}\}$. Determine its domain and range.
6. A relation f is defind by $f(x) = x^2 - 2$ where, $x \in \{-2,-1,0,3\}$ (i) List the element of f (ii) Is f a function.
7. If $R = \{(x,2),(-5,y)\}$ represent the identity function, find the values of x and y.
8. Let f be a fuction $f: \mathbb{N} \to \mathbb{N}$ be defined by $f(x) = 3x + 2,\ \ x \in N$

   (i) Find the images of 1,2,3 (ii) find the pre-images of 29,53

   (iii)Identify the type fuction
9. Let $A = \{1,2,3\}, B = \{4,5,6,7\}$ and $f = \{(1,4),(2,5),(3,6)\}$ be a fuction from A to B. Show that f is one-one but not onto function.
10. If $A = \{-2,-1,0,1,2\}$ and $f: A \to B$ is an onto defined by $f(x) = x^2 + x + 1$ then find B.
11. Let f be a function from $\mathbb{R}\ to\ \mathbb{R}$ defined by $(x) = 3x - 5$. Find the value of a and b given that $(a,4)$ and $(1,b)$ belong to f.
12. Let A={1,2,3,4} and B=N. Let $f: A \to B$ be defind by $f(x) = x^3$ then (i) find the range of f (ii) Identify the type of function
13. Find k, if $fof(k) = 5$ where $f(k) = 2k - 1$.
14. If $f(x) = x^2 - 1,\ \ g(x) = x - 2$ find , $gof(a) = 1$
15. Find k, if $f(k) = 2k - 1$ and $fof(k) = 5$
16. A plane is flying at a speed of $500km$ per hour. Express the distance d travelled by the plane as function of time t in hours.
17. A function f is define by $f(x) = 3 - 2x$. Find x such that $f(x^2) = (f(x))^2$.
18. Let $A = \{1,2,3\}\ and\ B = \{x/x\ is\ a\ prime\ number\ less\ than\ 10\}$. Find the $A \times B$ and $B \times A$.
19. If $B \times A = \{(-2,3),(-2,4),(0,3),(0,4),(3,3),(3,4)\}$ find A and B.
20. Find fog and gof when $f(x) = 2x + 1$ and $g(x) = x^2 - 2$.
21. Given $f(x) = 2x - x^2$. Find $(i)\ f(1)\ \ (ii)\ f(x+1)\ \ (iii)\ f(x) + f(1)$

5 Marks:

1. Let $A = \{x \in N/1 < x < 4\}$, $B = \{x \in W/0 \leq x < 2\}$ and $C = \{x \in N/x < 3\}$ then verify that
   (i) $A \times (B \cup B) = (A \times B) \cup (A \times C)$
   (ii) $A \times (B \cap C) = (A \times B) \cap (A \times C)$
2. Let $A = \{x \in W/x < 2\}$, $B = \{x \in N/1 < x \leq 4\}$ and $C = \{3,5\}$
   (i) $A \times (B \cup C) = (A \times B) \cup (A \times C)$
   (ii) $A \times (B \cap C) = (A \times B) \cap (A \times C)$
   (iii) $(A \cup B) \times C = (A \times C) \cup (B \times C)$
3. Let $A = \{1,2,3,4\}$ and $B = \{2,5,8,11,14\}$ be two sets. Let $f: A \to B$ 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
4. Let $f: A \to B$ 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) Graph.
5. If the function $f: \mathbb{R} \to \mathbb{R}$ is defined by $f(x) = \begin{cases} 2x + 7, & x < -2 \\ x^2 - 2, & -2 \leq x < 3 \\ 3x - 2, & x \geq 3 \end{cases}$
   (i) $f(4)$ (ii) $f(-2)$ (iii) $f(4) + 2f(1)$ (iv) $\frac{f(1)-3f(4)}{f(-3)}$
6. A function $f: [-5,9] \to R$ is defined as follows:
$$f(x) = f(x) = \begin{cases} 6x + 1 & if \ -5 \leq x < 2 \\ 5x^2 - 1 & if \ 2 \leq x < 6 \\ 3x - 4 & if \ 6 \leq x \leq 9 \end{cases}$$
   (i) $f(-3) + f(2)$ $(ii) f(-7) - f(1)$ $(iii)\ 2f(4) + f(8)$ (iv) $\frac{2f(-2)2f(6)}{f(4)+f(-2)}$
7. The function t which maps temperature in Celsius (C) into temperature Fahreheit (F) is definded by t(C) where $F = \frac{9}{5}C + 32$. Find
   (i) t(0) (ii) t(28) (iii) t(-10)
   (iv) The value of C when t(C) = 212.
   (v) The temperature when the Celsius value is equal to the Farenherit value.
8. If $f(x) = 3x - 2, g()x = 2x + k$ and if $fog = gof$ then find the value of k.
9. If $f(x) = 2x + 3, g(x) = 1 - 2x$ and $h(x) = 3x$. Prove that $fo(goh) = (fog)oh$.
10. If $f: \mathbb{R} \to \mathbb{R}$ and $g: \mathbb{R} \to \mathbb{R}$ are defined by $f(x) = x^5$ and $g(x) = x^4$ then check if f, g are one-one and fog is one-one?
11. Consider the functions, $f(x), g(x), h(x)$ as given below. Show that
   (i) $f(x) = x - 1, g(x) = 3x + 1$ and $h(x) = x^2$
   (ii) $f(x) = x^2$, $g(x) = 2x$ and $h(x) = x + 4$

(iii) $f(x) = x - 4$, $g(x) = x^2$ and $h(x) = 3x + 5$

2. NUMBERS AND SEQUENCES

2 Marks:

1. A man has 532 flower pots. He wants to arrange them in rows such that each row contains 21 flowers pots. Find the number of completed rows and how many flower pots are left over.
2. Use Euclid's Division Algorithm to find the HCF of 867 and 255.
3. Is $7 \times 5 \times 3 \times 2 + 3$ a composite number? Justify your answer.
4. Find the least positive value of x such that $67 + x \equiv 1(mod\ 4)$.
5. Compute x, such that $10^4 \equiv x(mod\ 19)$
6. Find the number of integer solutions of $3x \equiv 1(mod\ 15)$.
7. Solve $5x \equiv 4\ (mod\ 6)$.
8. Find the first five terms of the following sequence $a_1 = 1$, $a_2 = 1$, $a_n = \frac{a_{n-1}}{a_{n-2}+3}$; $n \geq 3, n \in N$
9. Find the indicated terms of the sequences whose n^{th} terms are given by $a_n = \frac{5n}{n+2}$; a_6 *and* a_{13}.
10. Find the number of terms in the A.P 3,6,9,12, … . ,111
11. Find the middle terms of an A.P 9,15,21,27, … ,183.
12. Find the common difference of an A.P in which $t_{18} - t_{14} = 32$
13. If $3 + k, 18 - k, 5k + 1$ are in A.P then find k.
14. In a theatre, there are 20 seats in the front row and 30 rows were allotted. Each successive row contains two additional seats than its front row. How many seats are there in the last row?
15. Find the sum of all odd positive integers less than 450.
16. Find the geometric progression whose first term and common ratios are given $= -7$, $r = 6$.
17. In G.P $\frac{1}{4}, \frac{-1}{2}, 1, -2, \ldots$ find t_{10}.
18. In G.P 729 , 243 , 81 ,….. find t_7.
19. Find x so that $x + 6, x + 12$ and $x + 15$ are consecutive terms of a Geometric Progression.
20. Find the rational form of the number $\overline{0.123}$.
21. Find the sum of $1 + 3 + 5 + \cdots + 55$.
22. If $1 + 2 + 3 + \cdots + n = 666$ then find n.
23. If $1^3 + 2^3 + 3^3 + \cdots + k^3 = 16{,}900$ then find $1 + 2 + 3 + \cdots + k$.
24. If $1 + 2 + 3 + \cdots + k = 325$ then find $1^3 + 2^3 + 3^3 + \cdots + k^3$.
25. If $1^3 + 2^3 + 3^3 + \cdots + k^3 = 3025$ then find the sum of the first k natural number.

5 Marks:

1. Find the HCF of 396, 504, 636.
2. In an A.P., sum of four consecutive terms is 28 and their sum of their squares is 276. Find the four numbers.
3. The sum of three consecutive terms that are A.P is 27 and their product is 288. Find the three terms.
4. The ratio of 6^{th} and 8^{th} term of an A.P is $7:9$. Find the ratio of 9^{th} term to 13^{th} term.
5. If the sum of the first p terms of an A.P is $ap^2 + bp$. Find its common difference.
6. Find the sum of all natural number between 300 and 600 which are divisible by 7.
7. The sum of first n, $2n$, and $3n$ terms of an A.P are S_1, S_2 and S_3 respectively. Prove that $S_3 = 3(S_2 - S_1)$.
8. A man repays a loan of $ 65,000 by paying $ 400 in the first month and then increasing the payment by $ 300 every month. How long will it take for him to clear the loan?
9. If $S_1, S_2, S_3, \dots, S_n$ are the sums of n terms of m A.P's whose first terms are $1,2,3,\dots,m$ and whose common differences are $1,3,5,\dots(2m-1)$ respectively, then show that $S_1 + S_2 + S_3 + \cdots + S_m = \frac{1}{2}mn(mn+1)$.
10. Find the sum $\left[\frac{a-b}{a+b} + \frac{3a-2b}{a+b} + \frac{5a-3b}{a+b} + \cdots to\ 12\ terms\right]$.
11. Find the sum to n terms of the series $5 + 55 + 555 + \cdots$
12. Find the sum to n terms of the series $0.4 + 0.44 + 0.444 + \cdots$
13. Find the sum to n terms of the series $3 + 33 + 333 + \cdots$
14. If $S_n = (x+y) + (x^2 + xy + y^2) + (x^3 + x^2y + xy^2 + y^3) + \cdots n$ terms then prove that $(x-y)S_n = \left[\frac{x^2(x^n-1)}{x-1} - \frac{y^2(y^n-1)}{y-1}\right]$.
15. Find the sum of the geometric series $3 + 6 + 12 + \cdots + 1536$.
16. Find the sum of $15^2 + 16^2 + 17^2 + \cdots + 28^2$.
17. Find the sum of $9^3 + 10^3 + 11^3 + \cdots + 21^3$.
18. Find the sum of $10^3 + 11^3 + 12^3 + \cdots + 20^3$.
19. If $1^3 + 2^3 + 3^3 + \cdots + k^3 = 44{,}100$ then find $1 + 2 + 3 + \cdots + k$.
20. How many terms of the series $1^3 + 2^3 + 3^3 + \cdots$ should be taken to get the sum 14,000?
21. The sum of the squares of the first n natural numbers is 285, while the sum of their cubes is 2025. Find the value of n.
22. Rekha has 15 square colour papers of sizes 10cm, 11cm, 12cm, …., 24cm. How much area can be decorated with these colour papers?
23. Find the sum of the series $(2^3 - 1) + (4^3 - 3^3) + (6^3 - 15^3) + \cdots$ to be (i) n terms (ii) 8 terms.

3. ALGEBRA

2 Marks

1. Find the LCM of the following.

   (i) $5x - 10, 5x^2 - 20$ (ii) $p^2 - 3p + 2,\ p^2 - 4$ $(iii)\ (2x^2 - 3xy)^2, (4x - 6y)^3, 8x^3 - 27y^3$

2. Find the excluded values of the following

   (i) $\frac{x+10}{8x}$ (ii) $\frac{7p+2}{8p^2+13p+5}$

3. Simplify (i) $\frac{x^2-16}{x+4} \div \frac{x-4}{x+4}$ (ii) $\frac{5t^3}{4t-8} \times \frac{6t-12}{10t}$ (iii) $\frac{x^3}{x-y} + \frac{y^3}{y-x}$ (iv) $\frac{4x}{x^2-1} - \frac{x+1}{x-1}$

4. Find the square root $\frac{400x^4y^{12}z^{16}}{100x^8y^4z^4}$

5. Find the square root $\frac{144a^8b^{12}c^{16}}{81f^{12}g^4h^{14}}$

6. Determine the quadratic equation whose sum and product of roots are $\frac{-3}{2}$ $and - 1.$

7. Find the sum and product of the roots for each of the following quadratic equations.

   (i) $x^2 + 8x - 65 = 0$ (ii) $x^2 + 3x = 0$ (iii) $3 + \frac{1}{a} = \frac{10}{a^2}$

8. Solve : $\frac{x}{x-1} + \frac{x-1}{x} = 2\frac{1}{2}$

9. Solve : $x^2 - 16 = 0$

10. Solve by factorization method: $2x^2 - 2\sqrt{6}x + 3 = 0.$

11. Solve : $x^4 - 13x + 42 = 0.$

12. Solve the following quadratic equations by formula method

    (i) $2x^2 - 5x + 2 = 0$ (ii) $2x^2 - 3x - 3 = 0$ (iii) $x^2 + 2x - 2 = 0$

13. Determine the nature of roots for the following quadratic equations.

    (i) $9x^2 - 24x + 16 = 0$ (ii) $15x^2 + 11x + 2 = 0$

14. If α and β are the roots of $x^2 + 7x + 10 = 0$ find the values of (i) $(\alpha - \beta)$ (ii) $\alpha^2 + \beta^2$

    (iii) $\alpha^3 - \beta^3$ (iv) $\alpha^4 + \beta^4$

15. The roots of the equation $2x^2 - 7x + 5 = 0$ are α and β

    (i) $\frac{1}{\alpha} + \frac{1}{\beta}$ (ii) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

16. Dividing the polynomial $p(x) = x^2 - 5x - 14$ by another polynomial $q(x)$ yields $\frac{x-7}{x+2}$, then find $q(x)$.

17. Which rational expression should be subtracted from $\frac{x^2+6x+8}{x^8+8}$ to get $\frac{3}{x^2-2x+4}$

18. Find the value of p, when $px^2 + (\sqrt{3} - \sqrt{2})x - 1 = 0$ and $x = \frac{1}{\sqrt{3}}$ is one root of the equation.

19. If two positive integers p and q are written as $p = a^2b^3$ and $q = a^3b$; a, b prime number, then verify $LCM(p,q) \times HCF(p,q) = pq$.
20. If one root of the equation $3x^2 + kx + 81 = 0$ (having real root) is the square of the other, then find k.

5 Marks

1. Solve : $\frac{1}{2x} + \frac{1}{4y} - \frac{1}{3z} = \frac{1}{4}$; $\frac{1}{x} = \frac{1}{3y}$, $\frac{1}{x} - \frac{1}{5y} + \frac{4}{z} = 2\frac{2}{15}$
2. Solve : $x + y + z = 5$, $2x - y + z = 9$, $x - 2y + 3z = 16$
3. Solve : $2x + y + 4z = 15$, $x - 2y + 3z = 13$, $3x + y - z = 2$
4. Solve : $x + 2y - z = 6$, $-3x - 2y + 5z = -12$, $x - 2z = 13$
5. Find the GCD of the polynomials $x^3 + x^2 - x + 2$ and $2x^3 - 5x^2 + 5x - 3$.
6. Find the GCD of $6x^3 - 30x^2 + 60x - 48$ and $3x^3 - 12x^2 + 21x - 18$
7. Find the GCD of $3x^3 + 3x^2 + 3x + 3$ and $6x^3 + 12x^2 + 6x + 12$.
8. Simplify $\frac{p^2-10p+21}{p-7} \times \frac{p^2+p-12}{(p-3)^2}$
9. Simplify $\frac{1}{x^2+5x+6} + \frac{1}{x^2-3x+2} - \frac{1}{x^2-8x+15}$
10. If $A = \frac{2x+1}{2x-1}$, $B = \frac{2x-1}{2x+1}$ find $\frac{1}{A-B} - \frac{2B}{A^2-B^2}$
11. Find the square root.

$$[\sqrt{5}x^2 + (\sqrt{3} + \sqrt{10})x + \sqrt{2}][\sqrt{5}x^2 + (2\sqrt{5} + 1)x + 2][\sqrt{3}x^2 + (\sqrt{2} + 2\sqrt{3})x + 2\sqrt{2}]$$

12. Find the square roots of the following
    (i) $64x^4 - 16x^3 + 17x^2 - 2x + 1$
    (ii) $\frac{4x^2}{y^2} + \frac{20x}{y} + 13 - \frac{30y}{x} + \frac{9y^2}{x^2}$
    (iii) $37x^2 - 28x^3 + 4x^4 + 42x + 9$
    (iv) $121x^4 - 198x^3 - 83x^2 + 216x + 144$
13. Find the value of a and b.
    (i) $9x^4 + 12x^3 + 28x^2 + ax + b$
    (ii) $4x^4 - 12x^3 + 37x^2 + bx + a$
    (iii) $ax^4 + bx^3 + 361x^2 + 220x + 100$
14. Find the value of m and n . $x^4 - 8x^3 + mx^2 + nx + 16$
15. The hypotenuse of a right angled triangle is 25cm and its perimeter 56cm. Find the length of the smallest side.
16. 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) $a^3 + b^3 + c^3 = 3abc$

17. If α, β are the roots of the equation $3x^2 + 7x - 2 = 0$, find the values of $(i)\ \frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

    (ii) $\frac{\alpha^2}{\beta^2} + \frac{\beta^2}{\alpha^2}$

18. The roots of the equation $x^2 + 6x - 4 = 0$ are α, β Find the quadratic equation whose roots are (i) α^2 and β^2 (ii) $\frac{2}{\alpha}$ and $\frac{2}{\beta}$ (iii) $\alpha^2\beta$ and $\beta^2\alpha$

19. Solve the quadratic equation by completing the square method $\frac{5x+7}{x-1} = 3x + 2$.

20. Solve the equation $\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}$, where $x + 1 \neq 0,\ x + 2 \neq 0$ and $x + 2 \neq 0$ using quadratic formula.

21. Simplify : $\frac{a^2-16}{a^3-8} \times \frac{2a^2-3a-2}{2a^2+9a+4} \div \frac{3a^2-11a-4}{a^2-2a+4}$.

MATRIX

2 Marks

1. Construct a 3×3 matrix whose elements are given by $a_{ij} = |i - 2j|$.
2. If $A = \begin{pmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{pmatrix}$ then find the transpose of $-A$.
3. If $A = \begin{pmatrix} 7 & 8 & 6 \\ 1 & 3 & 9 \\ -4 & 3 & -1 \end{pmatrix}$, $B = \begin{pmatrix} 4 & 11 & -3 \\ -1 & 2 & 4 \\ 7 & 5 & 0 \end{pmatrix}$ then find 2A+B.
4. Find the X and Y if $X + Y = \begin{pmatrix} 7 & 0 \\ 3 & 5 \end{pmatrix}$ and $X - Y = \begin{pmatrix} 3 & 0 \\ 0 & 4 \end{pmatrix}$.
5. If $A = \begin{pmatrix} 0 & 4 & 9 \\ 8 & 3 & 7 \end{pmatrix}$, $B = \begin{pmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{pmatrix}$ find the value of $(i)\ B - 5A$ $(ii)\ 3A - 9B$
6. Find the non-zero values of x satisfying the matrix equation

   $x\begin{pmatrix} 2x & 2 \\ 3 & x \end{pmatrix} + 2\begin{pmatrix} 8 & 5x \\ 4 & 4x \end{pmatrix} = 2\begin{pmatrix} x^2 + 8 & 24 \\ 10 & 6x \end{pmatrix}$.
7. If A is of order $p \times q$ and B is of order $q \times r$ what is the order of AB and BA?

5 Marks

1. If $A = \begin{pmatrix} 1 & 1 \\ -1 & 3 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 3 \\ -4 & 2 \end{pmatrix}$, $C = \begin{pmatrix} -7 & 6 \\ 3 & 2 \end{pmatrix}$ verify that $A(B + C) = AB + AC$.
2. If $A = \begin{pmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{pmatrix}$ Show that $(AB)^T = B^T A^T$.
3. Let $A = \begin{pmatrix} 1 & 2 \\ 1 & 3 \end{pmatrix}$, $B = \begin{pmatrix} 4 & 0 \\ 1 & 5 \end{pmatrix}$, $C = \begin{pmatrix} 2 & 0 \\ 1 & 2 \end{pmatrix}$ Show that

(i) $A(BC) = (AB)C$ (ii) $(A - B)^T = A^T - B^T$.

4. If $A = \begin{pmatrix} cos\theta & 0 \\ 0 & cos\theta \end{pmatrix}$, $B = \begin{pmatrix} sin\theta & 0 \\ 0 & sin\theta \end{pmatrix}$ then show that $A^2 + B^2 = I$.
5. If $A = \begin{pmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{pmatrix}$ verify that $(AB)^T = B^T A^T$.
6. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ show that $A^2 - 5A + 7I_2 = 0$
7. If $A = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$ show that $A^2 - 4A + 5I_2 = 0$.
8. If $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 0 & 3 \\ -1 & 5 \end{pmatrix}$, $C = \begin{pmatrix} -1 & 5 \\ 1 & 3 \end{pmatrix}$ Prove that $A(BC) = (AB)C$.

5. COORDINATE GEOMETRY

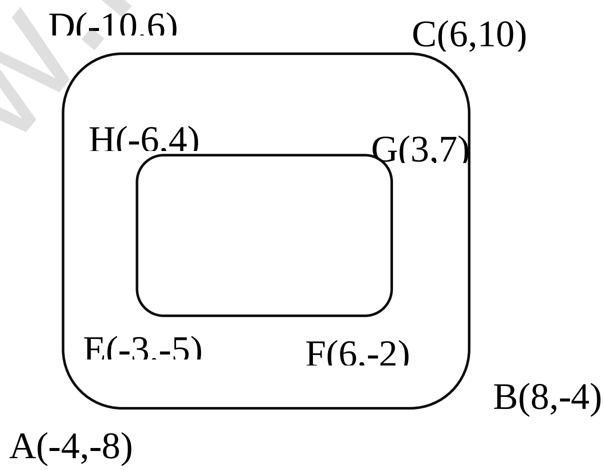
2 Marks:

1. Show that the points P(-1,5,3), Q(6,-2), R(-3,4) are collinear.
2. (2,3),(4,a)and(6,-3) points are collinear.
3. The line through the points (-2,6) and (4,8) is perpendicular to the line through the points (8,12) and (x,24). Find the value of x.
4. Calculate the slope and y intercept of the straight line $8x - 7y + 6 = 0$.
5. Find the equation of a straight line passing through the point (3,-4) and have slope $\frac{-5}{7}$
6. Find the equation of a straight line passing through (5,-3) and (7,-4).
7. Find the equation of a line which passes through (5,7) and makes intercepts on the axes equal in magnitude but opposite in sign.
8. What is the inclination of a line whose slope is 1 ?
9. Find the intercept made by the line $4x - ay + 36 = 0$ on the coordinate axes.
10. Fin the slope of a line joining the points $(sin\theta\,, -cos\theta)\ and\ (-sin\theta\,, cos\theta)$
11. Find the slope and y intercept of $\sqrt{3}x + (1 - \sqrt{3})y = 3$.
12. Find the slope of the straight line $6x + 8y + 7 = 0$.
13. Find the slope of the line which is (i) parallel to $3x - 7y = 11$ (ii) perpendicular $2x - 3y + 8 = 0$.
14. Show that the straight lines $3x - 5y + 7 = 0$ and $15x + ay + 4 = 0$ are perpendicular.
15. Show that the straight lines $x - 2y + 3 = 0$ and $6x + 3y + 8 = 0$ are perpendicular.
16. Find the equation of a straight line which parallel to the line $3x - 7y = 12$ and passing through the point (6,4)
17. Find the slope of the straight lines $5y - 3 = 0$
18. Check whether the given lines are parallel or perpendicular. $5x + 2y + 14 = 0$ and $23x - 5y + 9 = 0$.

19. If the straight lines $12y = -(p+3)x + 12, 12x - 7y = 16$ are perpendicular then find "p".
20. The hill in the form of a right triangle has its foot at (19,3). The inclination of the hill to the ground is $45°$. Find the equation of the hill joining the foot and top.

5 Marks:

1. Find the are of the triangle format by the points
   (i) (-3,5), (5,6) and (5,-2)
   (ii) (1,-1), (-4,6) and (-3,-5)
   (iii) (-10,-4), (-8,-1) and (-3,-5).
2. Find the area of the quadrilateral whose vertices are at
   (i) (8,6), (5,11), (-5,-12) and (-4,3)
   (ii) (-9,-2), (-8,-4), (2,2) and (1,3)
   (iii) (-9,0), (-8,6), (-1,-2) and (-6,-3)
3. If the area of the triangle format by the vertices A (-1,2), B(k,-2) and C (7,4) is 22 sq.units find the value of k.
4. Find the value of k, if the area of the quadrilateral is 28 sq.units, whose vertices are (-4,-2),(-3,k),(3,-2) and (2,3).
5. If the points P(-1,-4), Q(b, c) and R(5,-1) are collinear and if $2b + c = 4$, then find the values of b and c.
6. If the points A(-3,9), B(a, b) and C(4,-5) are collinear and if $a + b = 1$, then find a and b.
7. In the fiqure , the quadrilateral swimming pool shown is surrounded by concrete patio. Find the area of the patio.



8. Show that the points (-2,5),(6,-1) and (2,2) are collinear.
9. Without using Pythagoras theorem, show that the points (1,-4), (2,-3) and (4,-7) from a right angled triangle.
10. Let A(3,-4), B(9,-4), C(5,-7) and D(7,-7) show that ABCD is a trapezium.
11. PQRS is a rhombus. Its diagonals PR and QS intersect at the point M and satisfy QS=2PR. If the coordinates of S and M are (1,1) and (2,-1) respectively, find the coordinates of P.
12. A line makes positive intercepts on coordinate axes whose sum is 7 and it passes through (-3,8). Find its equation .
13. Find the equation of the median and altitude of ΔABC through A where the vertices are A(6,2) , B(-5,-1) and C(1,9)
14. Find the equation of a straight line parallel to y axis and passing the point of intersection of the lines $4x + 5y = 13$ and $x - 8y + 9 = 0$.
15. Find the equation of a line passing through (6,-2) and perpendicular to the line joining the points (6,7) and (2,-3).
16. Find the equation of a straight line joining the point of intersection of $3x + y + 2 = 0$ and $x - 2y - 4 = 0$ to the point of intersection of $7x - 3y = -12$ and $2y = x + 3$.
17. The area of a triangle is 5 sq.units. Two of its vertices are (2,1) and (3,-2). The third vertex lies on the line $y = x + 3$. Find the third vertex.

6. TRIGONOMETRY

2 Marks:

1. Prove that $tan^2\theta - sin^2\theta = tan^2\theta . sin^2\theta$.
2. Prove that $sec\theta - cos\theta = tan\theta . sin\theta$
3. Prove that $\sqrt{\frac{1+cos\theta}{1-cos\theta}} = cosec\theta + cot\theta$
4. Prove that $\sqrt{\frac{1+sin\theta}{1-sin\theta}} = sec\theta + tan\theta$
5. Prove that $\sqrt{\frac{1+sin\theta}{1-sin\theta}} + \sqrt{\frac{1-sin\theta}{1+sin\theta}} = 2\ sec\theta$
6. Prove that $\frac{sin^3A+cos^3A}{sinA+cosA} + \frac{sin^3A-cos^3A}{sinA-cosA} = 2$
7. Prove that $\frac{1}{cosec\theta - sin\theta} = tan\theta . sec\theta$
8. Prove that $\sqrt{\frac{sec\theta-tan\theta}{sec\theta+tan\theta}} = \frac{1-sin\theta}{cos\theta}$

9. Prove that $\frac{sinA}{1+cosA} = cosecA - cotA$
10. Prove that $\frac{1+secA}{secA} = \frac{sin^2A}{1-cosA}$
11. Prove that $\frac{cotA-cosA}{cotA+cosA} = \frac{cosecA-1}{cosec+1}$
12. A tower stands vertically on the ground. From a point on the ground, which is $48\ m$ away from the foot of the tower, the angle of elevation of the tower is $30°$. Find the height of the tower.
13. A kite is flying at a height of $75\ m$ above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is $60°$. Find the length of the string, assuming that there is no slack in the string.
14. Find the angle of elevation of the top of a tower from a point on the ground, which is $30\ m$ away from the foot of a tower of height $10\sqrt{3}$.
15. A player sitting on the top of a tower of height $20\ m$ observes the angle of depression of a ball lying on the ground as $60°$. Find the distance between the foot of the tower and the ball. $(\sqrt{3} = 1.732)$.
16. From the top of a rock $50\sqrt{3}m$ high, the angle of despression of a car on the ground is observed to be $30°$. Find the distance of the car from the rock.
17. From the top of a $12\ m$ 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.

5 Marks:

1. Prove that $\left(\frac{cos^2A-sin^3A}{cosA-sinA}\right) - \left(\frac{cos^3A+sin^3A}{cosA+sinA}\right) = 2\ sinA.cosA$
2. If $\frac{cos^2\theta}{sin\theta} = p$ and $\frac{sin^2\theta}{cos\theta} = q$ then prove that $p^2q^2(p^2+q^2+3) = 1$
3. If $\sqrt{3}\ sin\theta - cos\theta = 0$, then show that $tan3\theta = \frac{3tan\theta - tan^3\theta}{1-3tan^2\theta}$
4. If $\frac{\cos\alpha}{\cos\beta} = m$, and $\frac{cos\alpha}{sin\beta} = n$ then prove that $(m^2+n^2)cos^2\beta = n^2$.
5. Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse as observed from the ships are $30°$ and $45°$ respectively. If the lighthouse is $200\ m$ high, find the distance between the two ships. $(\sqrt{3} = 1.732)$.
6. From a point on the ground, the angles of elevation of the bottom and top of a tower fixed at the top of a $30\ m$ high building are $45°$ and $60°$ respectively. Find the height of the tower.$(\sqrt{3} = 1.732)$
7. To a man standing outside his house, the angles of elevation of the top and bottom of a window are $60°$ and $45°$ respectively. If the height of the man is $180\ cm$ and if he is $5\ m$ away from the wall, what is the height of the window? $(\sqrt{3} = 1.732)$

8. The top of a 15 m high tower makes an angle of elevation of 60° with the bottom of an electronic pole and angle of elevation of 30° with the top of the pole. What is the height of the electronic pole?
9. From the top of a tower 50 m high, the angles of depression of the top and bottom of a tree are observed to be 30° and 45° respectively. Find the height of the tree.$(\sqrt{3} = 1.732)$.
10. As observed from the top of a 60 m high light house from the sea level, the angles of depression of two ships are 28° and 45°. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships.$(\tan 28° = 0.5317)$.
11. A man is watching a boat speeding away from the top of a tower. The boat makes an angles of depression of 60° with the man's eye when at a distance of 200 m from the tower. After 10 seconds, the angle of depression becomes 45°. What is the approximate speed of the boat (in km / hr), assuming that is sailing in still water?$(\sqrt{3} = 1.732)$.
12. An aeroplane at an altitude of 1800 m finds that two boats are sailing towards it in the same direction. The angles of depression of the boats as observed from the aeroplane are 60° and 30° respectively. Find the distance between the two boats.$(\sqrt{3} = 1.732)$.
13. From a window (h metres high above the ground) of a house in a street, the angles of elevation and depression of the top and the foot of another house on the opposite side of the street are θ_1 and θ_2 respectively. Show that the height of the opposite house is $h\left(1 + \frac{cot\theta_2}{cot\theta_1}\right)$.
14. From the top of a tree of height 13 m the angle of elevation and depression of the top and bottom of another tree are 45° and 30° respectively. Find the height of the second tree. $(\sqrt{3} = 1.732)$.
15. Two ships are sailing in the sea on either side of the lighthouse. The angles of depression of two ships as observed from the top of the lighthouse are 60° and 45° respectively. If the distance between the ships is $200\left(\frac{\sqrt{3}+1}{\sqrt{3}}\right)$ metres, find the height of the lighthouse.

7. MENDURATION

2 Marks

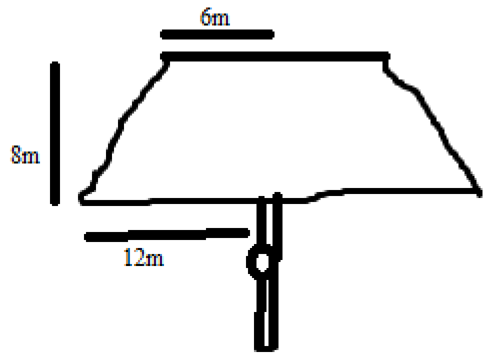
1. A cylindrical drum has a height of 20cm and base radius of 14cm. Find its curved surface area and total surface area.
2. The curved surface area of a right circular cylinder of height 14cm is $18cm^2$. Find the diameter of cylinder.
3. A garden roller whose length is 3m long and whose diameter is 2.8m is rolled level a garden. How much area will it cover in 8 revolutions?
4. If the total surface area of a cone of radius 7cm is $704cm^2$, the find its slant height.

5. Find the diameter of a sphere whose surface area is $154m^2$
6. The radius of a spherical balloon increases from 12cm to 16cm as air being pumped into it. Find the ratio of the surface area of the balloons in the two cases.
7. If the base area of a hemispherical solid is 1386 sq.metres, then find its total surface area?
8. The ratio of the radii of two right circular cones of same height is 1:3. Find the ratio of their curved surface area when the height of each cone is 3 times the radius of the smaller cone.
9. Find the volume of a cylinder whose height is 2m and whose base area is $250m^2$.
10. The volume of a cylindrical water tank is 1.078×10^6 litres. If the diameter of the tank is 7m, find its height.
11. The volume of a solid right circular cone is $11088cm^3$. If its height is 24cm then find the radius of the cone.
12. If the radii of the circular ends of a frustum which is 45cm high are 28cm and 7cm, find the volume of the frustum.
13. A 14m deep well with inner diameter 10m is dug and the earth taken out is evenly spread all around the well to form an embankment of width 5m. Find the height of the embankment.
14. If the circumference of a conical wooden piece is 484cm then find its volume when its height is 105cm.
15. The volumes of two cones of same base radius are $3600cm^3$ and $5040cm^3$. Find the radio of heights.
16. If the ratio of radii of two spheres is 4:7, find the ratio of their volumes.
17. A solid sphere and a solid hemisphere have equal total surface area. Prove that ratio of their volumes is $3\sqrt{3}: 4$.
18. A cone of height 24cm is made up modeling clay. A child reshape it in the form of a cylinder of same radius as cone. Find the height of the cylinder.

5 Marks

1. The radius of a conical tent is 7m and the height is 24m. Calculate the length of the canvas used to make the tent if the width of the rectangular canvas is 4m?
2. An industrial metallic bucket is in the shape of the frustum of a right circular cone whose top and bottom diameters are 10m and 4m and whose height is 4m. Find the curved and total surface area of the bucket.
3. A solid iron cylinder has total surface area of 1848 sq.m. Its curved surface area is five-sixth of its total surface area. Find the radius and height of the iron cylinder.
4. A girl wishes to prepare birthday caps in the form of right circular cones for her birthday party, using a sheet of paper whose area is 5720 cm^2, how many caps can be made with radius 5 cm and height 12 cm.

5. The frustum shaped outer portion of the table lamp has to be painted including the top part. Find the total cost of painting the lamp if the cost of painting 1 sq.cm is $ 2.



6. A toy is in the shape of a cylinder surmounted by a hemisphere. The height of the toy is 25 cm. Find the total surface area of the toy if its common diameter is 12 cm.
7. A funnel consists of a frustum of a cone attached to a cylindrical portion 12 cm long attached at the bottom. If the total height be 20 cm, diameter of the cylindrical portion be 12 cm and the diameter of the top of the funnel be 24 cm. Find the outer surface area of the funnel.
8. A vessel is in the form of a hemispherical bowl mounted by a hollow cylinder. The diameter is 14 cm and the height of the vessel is 13 cm. Find the capacity of the vessel.
9. Nathan, an engineering student was asked to make a model shaped like a cylinder with two cones attached at its two ends. The diameter of the model is 3 cm and its length is 12 cm. If each cone has a height of 2 cm, find the volume of the model that Nathan made.
10. A capsule is in the shape of a cylinder with two hemisphere stuck to each of its ends. If the length of the entire capsule is 12 mm and the diameter of the capsule is 3 mm, how much medicine it can hold?
11. A shuttle cock used for playing badminton has the shape of a frustum of a cone is mounted on a hemisphere. The diameters of the frustum are 5 cm and 2 cm. The height of the entire shuttle cock is 7 cm. Find its external surface area.
12. A right circular cylindrical container of base radius 6 cm and height 15 cm is full of ice cream. The ice cream is to be filled in cones of height 9 cm and base radius 3 cm, having a hemispherical cap. Find the number of cones needed to empty the container.
13. A solid right circular cone of diameter 14 cm and height 8 cm is melted to form a hollow sphere. If the external diameter of the sphere is 10 cm, find the internal diameter.
14. Seenu's house has an overhead tank in the shape of a cylinder. This is filled by pumping water from a sump (underground tank) which is in the shape of a cuboid. The sump has dimensions 2 m ´1.5 m ´ 1 m. The overhead tank has its radius of 60 cm and height 105 cm. Find the volume of the water left

in the sump after the overhead tank has been completely filled with water from the sump which has been full, initially.

15. A solid sphere of radius 6 cm is melted into a hollow cylinder of uniform thickness. If the external radius of the base of the cylinder is 5 cm and its height is 32 cm, then find the thickness of the cylinder.
16. A hemispherical bowl is filled to the brim with juice. The juice is poured into a cylindrical vessel whose radius is 50% more than its height. If the diameter is same for both the bowl and the cylinder then find the percentage of juice that can be transferred from the bowl into the cylindrical vessel.

8. STATISTICS AND PROBABILITY

2 Marks

1. Find the range and coefficient of range of the following data: 25, 67, 48, 53, 18, 39, 44.
2. Find the range of the following distribution.

Age (in year)	16-18	18-20	20-22	22-24	24-26	26-28
Number of students	0	4	6	8	2	2

3. The range of a set of data is 13.67 and the largest value is 70.08. Find the smallest value.
4. Find the range and coefficient of range of the following data.
   (i) 63, 89, 98, 125, 79, 108, 117, 68
   (ii) (ii) 43.5, 13.6, 18.9, 38.4, 61.4, 29.8
5. If the range and the smallest value of a set of data are 36.8 and 13.4 respectively, then find the largest value.
6. Find the standard deviation of first 21 natural numbers.
7. The standard deviation and coefficient of variation of a data are 1.2 and 25.6 respectively. Find the value of mean.
8. If the mean and coefficient of variation of a data are 15 and 48 respectively, then find the value of standard deviation
9. Find the coefficient of variation of 24, 26, 33, 37, 29, 31.
10. Find the co-efficient of variation of the data 18,20,15,12,25
11. Two coins are tossed together. What is the probability of getting different faces on the coins?
12. A die is rolled and a coin is tossed simultaneously. Find the probability that the die shows an odd number and the coin shows a head.
13. Write the sample space for tossing three coins using tree diagram.
14. Write the sample space for selecting two balls from a bag containing 6 balls numbered 1 to 6 (using tree diagram).
15. Three fair coins are tossed together. Find the probability of getting

(i) all heads (ii) atleast one tail (iii) atmost one head (iv) atmost two tails

16. If $P(A) = 0.37, P\ (B) = 0.42, P(A\ \cap B) =\ 0.09$ then find $P(A \cup\ B)$.

17. If $P(A) = \frac{2}{3},\ P(B) = \frac{2}{5},\ P(A \cup B)\frac{1}{3}$ then find $P(A \cap B)$.

18. If A and B are two mutually exclusive events of a random experiment and P(not A)=0.45 , P(AUB)=0.65, then find P(B).

19. A and B are two candidates seeking admission to IIT. The probability that A getting selected is 0.5 and the probability that both A and B getting selected is 0.3. Prove that the probability of B being selected is atmost 0.8.

20. The mean of a data is 25.6 and its coefficient of variation is 18.75. Find the standard deviation.

5 Marks

1. 48 students were asked to write the total number of hours per week they spent on watching television. With this information find the standard deviation of hours spent for watching television.

x	6	7	8	9	10	11	12
f	3	6	9	13	8	5	4

2. The marks scored by the students in a slip test are given below.

x	4	6	8	10	12
f	7	3	5	9	5

Find the standard deviation of their marks.

3. Marks of the students in a particular subject of a class are given below.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Number of students	8	12	17	14	9	7	4

4. Find the standard deviation of 25,29,30,33,35,37,38,40,44,48.

5. The time taken by 50 students to complete a 100 meter race are given below. Find its standard deviation.

Time taken(sec)	8.5-9.5	9.5-10.5	10.5-11.5	11.5-12.5	12.5-13.5
Number of students	6	8	17	10	9

6. The following table gives the values of mean and variance of heights and weights of the 10th standard students of a school.

	Height	Weight
Mean	155cm	$46.50kg^2$
Variance	$72.25cm^2$	$28.90kg^2$

Which is more varying than the other?

7. The consumption of number of guava and orange on a particular week by a family are given below.

Number of Guavas	3	5	6	4	3	5	4
Number of Oranges	1	3	7	9	2	6	2

Which fruit is consistently consumed by the family?

8. The time taken (in minutes) to complete a homework by 8 students in a day are given by 38, 40, 47, 44, 46, 43, 49, 53. Find the coefficient of variation.

9. The temperature of two cities A and B in a winter season are given below.

Temperature of city A (in degree Celsius)	18	20	22	24	26
Temperature of city B (in degree Celsius)	11	14	15	17	18

10. Two dice are rolled. Find the probability that the sum of outcomes is (i) equal to 4 (ii) greater than 10 (iii) less than 13

11. From a well shuffled pack of 52 cards, one card is drawn at random. Find the probability of getting (i) red card (ii) heart card (iii) red king (iv) face card (v) number card

12. A bag contains 6 green balls, some black and red balls. Number of black balls is as twice as the number of red balls. Probability of getting a green ball is thrice the probability of getting a red ball. Find (i) number of black balls (ii) total number of balls.

13. A game of chance consists of spinning an arrow which is equally likely to come to rest pointing to one of the numbers 1, 2, 3, …12. What is the probability that it will point to (i) 7 (ii) a prime number (iii) a composite number?

14. Two dice are rolled together. Find the probability of getting a doublet or sum of faces as 4.

15. If A and B are two events such that $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$, and $P(A\ and\ B) = \frac{1}{8}$, find (i) P(A or B) (ii) P(not A and not B).

16. A card is drawn from a pack of 52 cards. Find the probability of getting a king or a heart or a red card.
17. In a class of 50 students, 28 opted for NCC, 30 opted for NSS and 18 opted both NCC and NSS. One of the students is selected at random. Find the probability that
    (i) The student opted for NCC but not NSS.
    (ii) The student opted for NSS but not NCC.
    (iii) The student opted for exactly one of them.
18. A coin is tossed thrice. Find the probability of getting exactly two heads or atleast one tail or two consecutive heads.
19. If A, B, C are any three events such that probability of B is twice as that of probability of A and probability of C is thrice as that of probability of A and if $P(A \cap B) = \frac{1}{6}$, $P(B \cap C) = \frac{1}{4}$, $P(A \cap C) = \frac{1}{8}$, $P(A \cup B \cup C) = \frac{9}{10}$, $P(A \cap B \cap C) = \frac{1}{15}$, then find P(A), P(B) and P(C)?

GEOMETRY

1. Construct a triangle similar to a given triangle LMN with its sides equal to $\frac{4}{5}$
2. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle PQR (Scale Factor $\frac{7}{3}$).
3. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{3}{5}$ of the corresponding sides of the Δ PQR. (Scale Factor $\frac{3}{5} < 1$).
4. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{2}{3}$ of the corresponding sides of the Δ PQR. (Scale Factor $\frac{2}{3} < 1$).
5. Construct a triangle similar to a triangle PQR with its sides equal to $\frac{7}{4}$ of the corresponding sides of the ΔPQR. (Scale Factor $\frac{7}{4} > 1$).
6. Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{6}{5}$ of the corresponding sides of the ΔPQR (Scale Factor $\frac{6}{5}$).
7. Construct a ΔPQR in which PQ=5 cm $\angle P = 40°$ and the median PG from P to QR is 4.4 cm. Find the length of the altitude from P to QR.
8. Construct a ΔPQR which the base PQ=4.5 cm, $\angle R = 35°$ and the median from R to PQ is 6 cm.
9. Construct a ΔPQR such that QR=6.5 cm, $\angle P = 60°$ and the altitude from P to QR is of length 4.5 cm.
10. Construct a ΔPQR such that QR=5 cm, $\angle P = 30°$ and the altitude from P to QR is of length 4.2cm.

11. Construct a ΔABC such that AB=5.5cm, $\angle C = 25°$ and altitude from C to AB is 4cm.
12. Construct a ΔPQR such that PQ=6.8cm, $\angle R = 55°$ and the median RG from R to PQ=6cm.
13. Construct a ΔPQR in which PQ=8cm, $\angle R = 60°$, and the median RG from R to PQ is 5.8cm. Find the length of the altitude from R to PQ.
14. Draw a triangle ABC or base BC=5.6cm, $\angle A = 40°$ and the bisector of $\angle A$ meets BC at D such that CD=4cm.
15. Draw a ΔABC of base BC=8cm, $\angle A = 60°$ and the bisector of $\angle A$ meets BC at D such that BD=6cm.
16. Draw a circle of diameter 6cm from a point P, which is 8cm away from its center. Draw the two tangents PA and PB to the circle and measure their lengths.
17. Draw the two tangents from a point which is 10cm away from the center of a circle of radius 5cm. Also, measure the length of the tangents.
18. Draw a circle of diameter 6cm from a point P, which is 8cm away from its center. Draw the two tangents PA and PB to the circle and measure their lengths.
19. Draw the two tangents from a point which is 5cm away from the center of the circle of diameter 6cm. Also measure the length of the tangents.
20. Draw the two tangents from a point which is 11cm away from the center of the circle of diameter 4cm. Also measure the length of the tangents.
21. Draw a tangent at any point R on the circle of radius 3.4cm and center at P.
22. Draw a circle or radius 4cm. At a point L on it draw a tangent to the circle using the alternate segment.

GRAPHS

1. Discuss the nature of solution of the following quadratic equation. $x^2 - 9x + 20 = 0$.
2. Discuss the nature of solution of the following quadratic equation $x^2 - 4x + 4 = 0$
3. Discuss the nature of solution of the following quadratic equation $x^2 + x + 7 = 0$.
4. Discuss the nature of solution of the following quadratic equation $(2x - 3)(x + 2) = 0$
5. Draw the graph for the quadratic equation $x^2 + x - 12 = 0$ and state their nature of solutions
6. Draw the graph for the quadratic equation $x^2 - 8x + 16 = 0$ and state their nature of solutions.
7. Draw the graph for the quadratic equation $x^2 + 2x + 5 = 0$ and state their nature of solutions.
8. Draw the graph for the quadratic equation $x^2 - 9 = 0$ and state their nature of solutions.
9. Draw the graph for the quadratic equation $x^2 - 6x + 9 = 0$ and state their nature of solutions.
10. Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x - 2 = 0$.
11. Draw the graph of $y = x^2 - 5x - 6$ and hence use it to solve $x^2 - 5x - 14 = 0$.
12. Draw the graph of $y = 2x^2 - 3x - 5$ and hence use it to solve $2x^2 - 4x - 6 = 0$.
13. Draw the graph of $y = 2x^2$ and hence use it to solve $2x^2 - x - 6 = 0$.
14. Draw the graph of $y = x^2 - 4x + 3$ and hence use it to solve $x^2 - 6x + 9 = 0$.

15. Draw the graph of $y = (x-1)(x=3)$ and hence use it to solve $x^2 - x - 6 = 0$.
16. Draw the graph of $y = x^2 - 4$ and hence solve $x^2 - x - 12 = 0$.
17. Draw the graph of $y = x^2 + 4x + 3$ and hence solve $x^2 + x + 1 = 0$.
18. Draw the graph of $y = x^2 + x$ and hence solve $x^2 + 1 = 0$.
19. Draw the graph of $y = x^2 + 3x + 2$ and hence solve $x^2 + 2x + 1 = 0$.
20. Draw the graph of $y = x^2 + 3x - 4$ and hence solve $x^2 + 3x - 4 = 0$.