MATHEMATICS

STD : X

UNIT : 1 SETS AND FUNCTION

1. De Morgan's Laws :

For any three sets A, B and C

De Morgan's Laws for Complementation	De Morgan's Laws for Set difference
$(i)\ (A \cup B)' = A' \cap B'$	$(i)\ A \setminus (B \cup C) = (A \setminus B) \cap (A \setminus C)$
$(ii)\ (A \cap B)' = A' \cup B'$	$(ii)\ A \setminus (B \cap C) = (A \setminus B) \cup (A \setminus C)$

2. Commutative Property

(i) $A \cup B = B \cup A$

(ii) $A \cap B = B \cap A$

Associative Property

(i) $A \cup (B \cup C) = (A \cup B) \cup C$

(ii) $A \cap (B \cap C) = (A \cap B) \cap C$

3. Distributieve Property

(i) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

(ii) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

4. The Cardinal number of Sets :

(i) $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

(ii) $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A) + n(A \cap B \cap C)$

5. Representation of function

(i) a set of ordered pairs

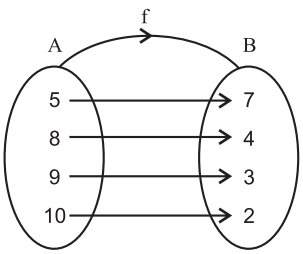
(ii) an arrow diagram

(iii) a table

(iv) a graph

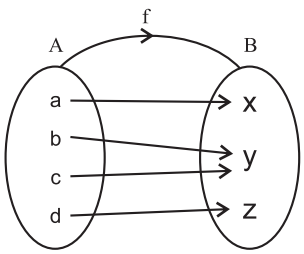
6. Types of functions :

(i)



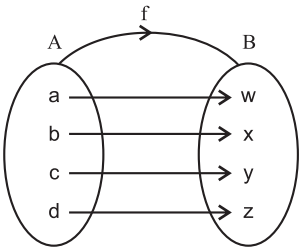
One - one Function
Different element in A has different image in B

(ii)



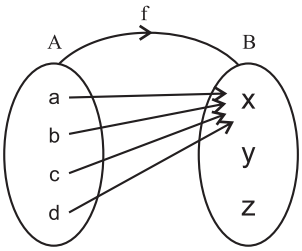
Onto Function
Every element in B has at least one pre - image in A

(iii)



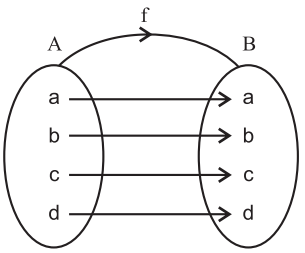
One - One and onto Function

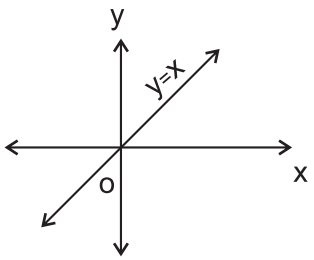
(iv)



Constant Function
Every element in A has same image in B

(v) **Identity Function :**





Every element in A is associteel with itself

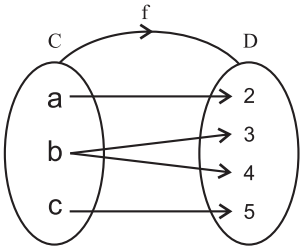
ONE MARK QUESTIONS :

1. For two sets A and B, $A \cup B = A \Leftrightarrow$ _____
2. If $A \subset B$, then $A \cap B =$ _____
3. $A \mid B = A \Leftrightarrow A \cap B =$ _____
4. If $A = \{ p,q,r,s \}$, $B = \{ r,s,t,u \}$ then $A \mid B =$ _____
5. If n [p(a)] = 64, then n(A) = _____
6. If n (U) = 700, n $(A \cup B) = 400$ then $n(A' \cup B') =$ _____
7. For any two sets A and B, $\{(A \mid B) \cup (B \mid A)\} \cap (A \cap B) =$ _____
8. Which one of the following is not true?

   (a) $A \mid B = A \cap B'$ (b) $A \mid B = A \cap B$

   (c) $A \mid B = (A \cup B) \cap B'$ (d) $A \mid B = (A \cup B) \mid B$
9. For any three sets A_1 band C, $B \mid = (A \cup C) =$ _____
10. If n(A)=20, n(B)=30 and $n(A \cup B)$=40, then $n(A \cap B) =$ _____
11. If { (x,2), (4,y) } represents an identity function then (x,y) is _____
12. If { (7,11), (5,a) } repersents a constant function, then the value of 'a' is_____
13. Given f (x) = $(-1)^x$ is a function from u to z then the range of f is _____

14. If f = { (6,3), (8,9), (5,3), (-1,6) }, then the pre_einages of 3 are _____
15. Let A = {1, 3, 4, 7, 11}, B = { -1, 1, 2, 5, 7, 9} and f : $A \to B$ be given by f = { (1,-1), (3, 2), (4,1), (7,5), (11,9) then f is _____ function.
16. The given diagram represents _____ a function



17. If A ⊂ B, then show that A ∪ B = B (use venn diagram)
18. Let P = { a, b, c }, Q = { g, h, x, y }, R = { a, e, f, s } find the following
    (i) P | R (ii) Q ∩ R (iii) R | (P∩Q)
19. If A = { 4, 6, 7, 8, 9 }, B = { 2, 4, 6 } and C = {1, 2, 3, 4, 5, 6 } then find
    (i) A ∪ (B ∩ C) (ii) A ∩ (B ∪ C) (iii) A | (C | B)
20. If f : A®B is a bijective function and if n(A) = 5, then n(B)=

TWO MARK QUESTIONS :

1. Given A = {a,x,y,r,s}, B = {1, 3, 5, 7, -10} Verify the commutative property of setunion.
2. Verify the commutative property of set intersection for A = { l, m, n, o, 2, 3, 4, 7 } and B = { 2, 5, 3, -2, m, n, o, p }
3. Using ven diagram
   (i) $A \cap (B \mid C)$ *(ii)* $(B \cup C) \mid A$ *(iii)* A and B are disjoint but both are subsets of C.
4. If A = { 4,6,7,8,9 }, B = { 2, 4, 6} and C = { 1, 2, 3, 4, 5, 6 } then find
   (i) $A \mid (C \mid B)$ *(ii)* $A \cap (B \cup C)$ *(iii)* $C \mid (A \cap B)$
5. Given n (U) = 700, n (A) = 200, (B) = 300 and n $(A \cap B)$ = 100, find n $(A' \cap B')$
6. Given n (A) = 285, n (B) = 195, n (U) = 500, n $(A \cup B) = 410$, find n $(A' \cup B')$
7. Let A = { 1, 2, 3, 4, 5 }, B = N and f : $A \to B$ be defined by f (x) = x^2. Find the range of f. Identity the type of function.
8. For the given function f = { (1,3), (2,5), (4,7), (5,9), (3,1) }, Write the domain and range.

9. If R ={ (a,-2), (-5,b), (8,c), (d,-1) } represents the identity function. Find the values of a, b, c and d.
10. A = { -2, -1, 1, 2 } and f = { $(x, \frac{1}{x})$: $X \in A$ } write down the range of f. If f a function from A to A ?
11. Whether f = {(1,-4), (1,-1), (9,-3), (16,2)} is a function from A = { 1, 4, 9, 16 } to B = { -1, 2, -3, -4, 5, 6 } in case of function, write down its range.
12. Write the pre-images of 2 and 3 in the function.
    f = { (12,2), (13,3), (15,3), (14,2), (17,17) }
13. If $A \subset B$, then show that $A \cup B = B$.
14. Let P = { a, b, c }, Q = { g, h, x, y } and R = { a, e, f, s }. Find
    (i) $P \mid R$ (ii) $Q \cap R$ (iii) $R \mid (P \cap Q)$
15. If A = { 4, 6, 7, 8, 9 }, B = { 2, 4, 6 } and C = { 1, 2, 3, 4, 5, 6 } then find
    (i) $A \cup (B \cap C)$ (ii) $A \cap (B \cup C)$ (iii) $A \mid (C \mid B)$
16. If $A \subset B$, then find $A \cap B$ and $A \mid B$.

FIVE MARK QUESTIONS :

1. Verify the following laws by using venn diagrams.
   (i) $(A \cap B)^1 = A^1 \cup B^1$ (ii) $(A \cup B)^1 = A^1 \cap B^1$
   (iii) $A \mid (B \cup C) = (A \mid B) \cap (A \mid C)$ (iv) $A \mid (B \cap C) = (A \mid B) \cup (A \mid C)$
   (v) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ (vi) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

2. Let U = { -2, -1, 0, 1, 2, 3,.....10}, A = { -2, 2, 3, 4, 5} and B = { 1, 3, 5, 8, 9}
   Verify De'Morgan's laws for Complementation.

3. Verify De'Morgan's laws for set difference using the sets given below.
   A = { 1, 3, 5, 7, 9, 11, 13, 15}, B = { 1, 2, 5, 7 } and C = { 3, 9, 10, 12, 13}

4. Let A = {0,1,2,3} and B = {1,3,5,7,9} be two sets. Let f:A→B be a function given by f(x) = 2x + 1represent this function as (i) a set of ordered pairs (ii) a table (iii) an arrow diagram and (iv) a graph

5. Let A = { 6, 9, 15, 18, 21 }, B = { 1, 2, 4, 5, 6} and f : A→B be defined by f (x) = $\frac{x-3}{3}$ represent f by,
   (i) An arrow digram (ii) a set of ordered pairs
   (iii) a table (iv) a graph

6. Let A = {4,6,8,10} and B = {3,4,5,6,7}. if f:A→B is defined by f(x) = $\frac{1}{2}x+1$ then represent f by (i) an arrow diagram (ii) a set of ordered pairs and (iii) a table

7. A function f : (-3, 7) → R is defined as follows $f(x) = \begin{pmatrix} 4x^2 - 1 & ; & -3 \le x < 2 \\ 3x - 2 & ; & 2 \le x \le 4 \\ 2x - 3 & ; & 4 < x < 7 \end{pmatrix}$

   find (i) f(5) + f(6) (ii) f(1) - f(-3) (iii) f(-2) + f(4) (iv) $\frac{f(3) + f(-1)}{2f(6) - f(1)}$

8. A function f : (-7,6)→R is defined as follows.

$$f(x) = \begin{pmatrix} x^2 + 2x + 1 & ; & -7 \le x < -5 \\ x + 5 & ; & -5 \le x \le 2 \\ x - 1 & ; & 2 < x < 6 \end{pmatrix}$$

find (i) 2f(-4) + 3f(2) (ii) f(-7) - f(-3) (iii) $\frac{4f(-3) + 2f(4)}{f(-6) - 3f(1)}$

9. A function f : [1,6] $\rightarrow$ R is defined as follows. f (x) = $\begin{pmatrix} 1+x & 1 \le x < 2 \\ 2x-1 & 2 \le x < 4 \\ 3x^2-10 & 4 \le x < 6 \end{pmatrix}$

(i) f (5) (ii) f (3) (iii) f (1) (iv) f (2) - f (4) (v) 2f (5) - 3f (1)

10. Let A = { 5, 6, 7, 8 }, B = { -11, 4, 7, -10, -7, -9, -13 } and f = { (x,y) : y = 3-2x, X ε A, Y ε B}

(i) Write down the elements of f (ii) What is the Co-domain?

(iii) What is the range? (iv) Identify the type of function

UNIT : II

SEQUENCES AND SERIES OF REAL NUMBERS

Arithmetic progression (A.P)	Geometric progression (G.P)
1. The general form a, a+d, a+2d,.....	General form a, ar, ar^2, ar^3,.....ar^{n-1}, ar^n
2. General term $t_n = a+(n-1)d$	General term $t_n = ar^{n-1}$
3. Three Consecutive terms a-d, a, a+d	Three Consecutive terms a/r, a, ar
4. (I) Number of terms $n = \left(\frac{l-a}{d}\right)+1$ (ii) Sum of first n terms [given d] $Sn = \frac{n}{2}[2a+(n-1)d]$ (iii) Sum of first n terms [given l] $Sn = \frac{n}{2}[a+l]$	The Sum of first n terms $Sn = \begin{cases} \frac{a(r^n-1)}{r^n-1} & r\neq 1 \\ na & r=1 \end{cases}$

SPECIAL SERIES

1. The Sum of first n natural numbers $1+2+3+.....+n = \frac{n(n+1)}{2}$
2. The Sum of squares of first n natural numbers
$$1^2+2^2+3^2+.....+n^2 = \frac{n(n+1)(2n+1)}{6}$$
3. The Sum of cubes of the first n natural numbers $1^3+2^3+3^3+.....+n^3 = \left[\frac{n(n+1)}{2}\right]^2$
4. The Sum of the first n odd natural numbers $1+3+5+.....+(2k-1) = n^2$
5. The Sum of first n odd natural numbers (Lis given) $1+3+5+.....+ \quad l = \left[\frac{l+1}{2}\right]$

ONE MARK QUESTIONS :

1. Which one of the following is not true?
   (a) A sequence is a real valued function defined on N.
   (b) Every function represence a sequence.
   (c) A sequence may have infinitely many terms.
   (d) A sequence may have a finite number of terms.
2. The 8^{th} term of the sequence 1,1,2,3,5,8,..... is _____.
3. The next term of 1/20 in the sequence ½,1/6, 1/12, 1/20,.....is _____.
4. If a,b c,l,m are in A.P, then the value of a-4b+6c-4l+m is _____.
5. If a,b,c are in A.P then $\frac{a-b}{b-c}$ is _____.

6. If the n^{th} term of a sequence is 100n + 10, then the sequence is _____.
7. If a_1, a_2, a_3,..... are in A.P. Such that $\frac{a_4}{a_7} = \frac{3}{2}$, then the 13^{th} term of A.P. is _____.
8. If the Sequence a_1, a_2, a_3..... is in A.P, then the sequence a_5, a_{10}, a_{15},..... is _____.
9. If K+2, 4K-6, 3K-2, are the three consecutive terms of an A.P, then the value of K is _____.
10. If a, b, c, l, m, n are in A.P, then 3a+7, 3b+7, 3c+7, 3l+7, 3m+7, 3n+7form_____
11. If the third term of a G.pis 2, then the product of first five terms is _____.
12. If a, b, c are in G.P then $\frac{a-b}{b-c}$ is equal to _____.
13. If x, 2x+2, 3x+3,.....are in G.P. then 5x, 10x+10, 15x + 15,..... Form_____
14. The sequence -3, -3, -3,..... is _____.
15. If the product of the first consecutive terms of a G.P. is 256 and if the common ratio is 4 and the first term is positive, then its 3rd term is_____.
16. In a G.P. $t_2 = \frac{3}{5}$ and $t_3 = \frac{1}{5}$, then the common ration is_____.
17. If $x \neq o$, then $1+\text{Sec } x+\text{Sec}^2x+\text{Sec}^3x+\text{Sec}^4x+\text{Sec}^5x$ is equal to _____.
18. If the n^{th} of an A.P is tn = 3-5n, then the Sum of the first n turms is_____.
19. The Common ratio of the G.P a^{m-n}, a^m, a^{m+n} is_____.
20. If 1+2+3+.....+n = k then $1^3+2^3+3^3+.....+n^3$ is equal to _____.

TWO MARK QUESTIONS :

1. Find the first five terms of the following sequence given by $a_1 = -1$, $a_n = \frac{a_{n-1}}{n+2}$ $n>1$ and $\forall\ n \in N$.

2. Find the 17^{th} term of the A.P. 4, 9, 14, ... _____.
3. How many two digit numbers are divisible by 13?
4. Find the Sum of the Arithmetic Series 5+11+17+.....+95.
5. Find the sum of the series 1 + 2 + 3 + ...+ 45.
6. Find the sum of the series 1 + 3 + 5 + ... 25 terms.

7. Find the sum of the series $1^2 + 2^2 + 3^2 + \ldots\ldots\ldots\ldots + 25^2$

8. Find the Value of K, if $1^3 + 2^3 + 3^3 + \ldots\ldots\ldots\ldots + K^3 = 4356$

9. Find the sum of the series $1^3 + 2^3 + 3^3 + \ldots\ldots\ldots\ldots + 20^3$.

10. Three numbers are in the ratio 2 : 5 : 7. If the first number, the resulting number on the subtraction of 7 from the second number and the third number form an arithmetic sequence, then find the numbers,

11. Find the 12^{th} term of an AP $\sqrt{2}, 3\sqrt{2}, 5\sqrt{2} \ldots\ldots\ldots\ldots\ldots\ldots$.

12. Find common difference and 15^{th} term of an AP 125, 120, 115, 110, ...

FIVE MARK QUESTIONS :

1. The Sum of the three consecutive terms in an A.P. is 6 and their product is -120. Find the three numbers.

2. If $a^x = b^y = c^z$, $x \neq o$, $y \neq o$, $z \neq o$ and $b^2 = ac$, then show that $\frac{1}{x}, \frac{1}{y}, \frac{1}{z}$ are in A.P.

3. If the 4^{th} and 7^{th} terms of a G.p are 54 and 1458 respectively, find the G.P?

4. Find the first three consecutive terms in G.P. whose sum is 7, and the sum of their reciprocals is $\frac{7}{4}$.

5. Find the sum of all 3 digit natural numbers, which are divisible by 9.

6. Find the sum to n terms of the series 6+66+666+.....

7. Find the sum of the series $16^2 + 17^2 + 18^2 + \ldots\ldots\ldots + 25^2$.

8. Find the sum of the series $16^3 + 17^3 + \ldots\ldots\ldots\ldots + 35^3$.

9. Find the total area of 12 squeres whose sides are 12cm, 13cm,.....23cm respectively.

10. Find the total volume of 15 cubes whose edges are 16cm, 17cm, 18cm.....30cm respectively.

11. Find the sum of all 3 digit natural numbers, which are divisible by 8

12. Find the sum to n turns of the series 7 + 77 + 777 + ...

UNIT - 3

ALGEBRA

Formulae :

1. $(a+b)^2 = a^2 + 2ab + b^2$
2. $(a-b)^2 = a^2 - 2ab + b^2$
3. $a^2 + b^2 = (a+b)^2 - 2ab$
4. $a^2 + b^2 = (a-b)^2 + 2ab$
5. $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$
6. $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$
7. $a^3+b^3 = (a+b)^3 - 3ab(a+b)$
8. $a^3 - b^3 = (a-b)^3 + 3ab(a-b)$
9. $a^4 + b^4 = (a^2 + b^2)^2 - 2a^2 b^2$
10. $a^4 - b^4 = (a+b)(a-b)(a^2 + b^2)$
11. $(a+b+c)^2 = a^2 + b^2 + c^2 + 2(ab+bc+ca)$
12. $(x+a)(x+b) = x^2 + (a+b)x + ab$
13. The basic relationship between zeros and co efficients of a quadratic polynomial $p(x) = ax^2 + bx + c$ are

$$\text{sum of zeros} = -\frac{b}{a} = -\frac{\text{co efficient of } x}{\text{co efficient of } x^2} \qquad \text{Product of zeros} = \frac{c}{a} = \frac{\text{constant term}}{\text{co efficient of } x^2}$$

14. i) For any polynomial p(x), x = a is zero if and only if p(a) = 0.
    ii) (x-a) is a factor for p(x) if and only if p(a) = 0.
15. f(x)g(x) =L.C.M.X.G.C.D (or) the product of LCM and GCD of any two polynomials is equal to the product of the two polynomials.
16. The roots of a quadratic equation $ax^2+bx+c=o$ are given by $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$
17. Discriminant

$\Delta = b2-4ac$	Nature of Roots
i) $\Delta > o$	Real and unequal
ii) $\Delta = o$	Real and equal
iii) $\Delta < o$	No real roots (It has imaginary roots)

18. If α and β are the roots of $ax^2+bx+c=o$, then

i) $|\alpha-\beta| = \sqrt{(\alpha-\beta)^2 - 4\alpha\beta}$

ii) $\alpha^2+\beta^2 = \left[(\alpha+\beta)^2 - 2\alpha\beta\right]$

iii) $\alpha^2-\beta^2 = (\alpha+\beta)(\alpha-\beta) = (\alpha+\beta)\left[\sqrt{(\alpha+\beta)^2-4\alpha\beta}\right]$ *only if* $\alpha \geq \beta$

iv) $\alpha^3+\beta^3 = (\alpha+\beta)^3 - 3\alpha\beta(\alpha+\beta)$

v) $\alpha^3-\beta^3 = (\alpha-\beta)^3 + 3\alpha\beta(\alpha-\beta)$

vi) $\alpha^4+\beta^4 = (\alpha^2+\beta^2)^2 - 2\alpha^2\beta^2 = \left[(\alpha+\beta)^2 - 2\alpha\beta\right]^2 - 2(\alpha\beta)^2$

vii) $\alpha^4-\beta^4 = (\alpha+\beta)(\alpha-\beta)(\alpha^2+\beta^2)$

ONE MARK QUESTIONS :

1. If the system 6x-2y = 3, kx-y=2 has a unique solution then.....
   (a) k=3 (b) k≠3 (c) k=4 (d) k≠4
2. A system of two linear equations in two variables is inconsistent, if their graphs
   (a) Coincide (b) intersect only at a print
   (c) do not intersect at any point (d) cut the x-ax is.
3. The system of equations x-4y = 8, 3x-12y=24
   (a) has infinitely (b) has no solution
   (c) has a unique solution (d) may or may not have a solution
4. If one zero of the polynomial p(x) = (k+4) x^2+13x+3k is resiprocal of the other, then k is equal to
   (a) 2 (b) 3 (c) 4 (d) 5
5. The sum of two zeros of the polynomial f(x) = $2x^2$+(p+3)x+5 is zero, then the value of p is
   (a) 3 (b) 4 (c) -3 (d) -4
6. The remainder when x^2-2x+7 is divided by x+4 is
   (a) 28 (b) 29 (c) 30 (d) 31
7. The quotient when x^3-5x^2+7x-4 is divided by x-1 is
   (a) x^2+4x+3 (b) x^2-4x+3 (c) x^2-4x-3 (d) x^2+4x-3
8. The GCD of (x^3+1) and x^4-1 is
   (a) x^3-1 (b) x^3+1 (c) x+1 (d) x-1

9. The GCD of $x^2-2xy+y^2$ and x^4-y^4 is

   (a) 1 (b) $x+y$ (c) $x-y$ (d) x^2-y^2

10. The LCM of x^3-a^3 and $(x-a)^2$ is

    (a) $(x^3-a^3)(x+a)$ (b) $(x^3-a^3)(x-a)^2$

    (c) $(x^2+ax+a^2)(x-a)^2$ (d) $(x+a)^2(x^2+ax+a^2)$

Fill in the blanks :

1. The LCM of a^k, a^{k+3}, a^{k+5} where $K \in N$ is_____.
2. The lowest form of the rational expression $\frac{x^2+5x+6}{x^2-x-6}$ is_____.
3. If $\frac{a+b}{a-b}$ and $\frac{a^3-b^3}{a^3+b^3}$ are the two rational expressions, then their product is_____.
4. On dividing $\frac{x^2-25}{x+3}$ by $\frac{x+5}{x^2-9}$ is equal to_____.
5. If $\frac{a^3}{a-b}$ is added with $\frac{b^3}{b-a}$, then the new expression is_____.
6. The square root of $49(x^2-2xy+y^2)^2$ is_____.
7. The square root of $x^2+y^2+z^2-2xy+2yz-2zx$ is_____.
8. The square root of $121x^4y^8z^6(l-m)^2$ is_____.
9. If $ax^2+bx+c=o$ has equal roots, then cis equal_____.
10. If $x^2+5kx+16=o$, has no real roots, then k_____.
11. A quadratic equlation whose one root is 3 is_____.
12. The common root of the equations $x^2-bx+c=o$ and $x^2+bx-a=o$ is_____.
13. If α,β are the roots of $ax^2+bx+c=o$, $a \neq o$, then the product of the roots is_____.
14. If α and β are the roots of $ax^2+bx+c=o$, then the equalion whose roots are $\frac{1}{\alpha}, \frac{1}{\beta}$ is_____.
15. Let $b=a+c$, then the equation $ax^2+bx+c=0$ has equal roots, if_____.

TWO MARK QUESTIONS :

1. Find a quadratic polynomial each with the sum and product of its zeros respectively.

   i) -4,3 ii) 3,1 iii) 2,4

2. Find a quadratic polynomial with zeros at $x=\frac{1}{4}$ and $x=-1$.

3. Find the quotient and remainder when x^3+x^2-7x-3 is divided by $x-3$.

4. Find the quotient and remainder using synthetic division.

   i. $(x^3+x^2-3x+5) \div (x-1)$ iii. $(3x^3+4x^2-10x+6) \div (3x-2)$

5. Solve the following quadratic equations by factorization method.

   i. $3x^2-5x-12=0$ ii. $3x-\frac{8}{x}=2$ iii. $6x^2-5x-25=0$

6. Solve the following equations by using quardratic formula :

   i. $x^2-7x+12=0$ ii. $15x^2-11x+2=0$ iii. $x+\frac{1}{x}=2\frac{1}{2}$

7. The sum of a number and its reciprocal is $5\frac{1}{5}$. Find the number.

8. Determine the nature of the roots of the following quadratic equations :

   i. $x^2-11x-10=0$ ii. $4x^2-28x+49=0$ iii. $2x^2-5x+5=0$

   iv. $x^2-8x+12=0$ v. $2x^2-3x+4=0$ vi. $9x^2+12x+4=0$

9. Find the values of k, for which the roots are real and equal in each of the following equations.

   i. $2x^2-10x+k=0$

10. If one of the roots of the equation $3x^2-10x+k=0$ is $\frac{1}{3}$, then find the other root and also the value of k.

11. Form the quadratic equation whose roots are $7+\sqrt{3}$ and $7-\sqrt{3}$

12. If α, β are the roots of the equation $3x^2-6x+4=0$. Find the value of $\alpha^2+\beta^2$

13. If the eq = $(1+m^2)\,x^2 + 2mcx + c^2 - a^2 = 0$ has equal roots, then P.T. $c^2 = a^2(1+m^2)$

14. If the roots of the eq = $(a2+b2)x2 - 2(ac+bd)x + c2+d2 = 0$ then a, b, c and d $\neq$ 0, are equal P.T. $\frac{a}{b}=\frac{c}{d}$

15. If one of the roots of the eq = $3x^2-10x+k = 0$ is $\frac{1}{3}$ then Eol the order root and also the value of k.

16. If the sum and product of the roots of the quadratic equation $ax^2-5x+c=0$ are both equal to 10, then tried the values of a and c.

5 Mark Questions :

1. Formulate the following problems as a pair of equations and chance find their solutions.
   I) A two digit number is 7 times the sum of its digits. The number formed by reversing the digit is 18 less than the given number. Find the given number.
   ii) 3Chairs and 2 tables cost rs.700 and 5 chairs and 3 tables cost rs.1100. What is the total cost of 2 chairs and 3 tables.

2. Factorize each of the following polynomials.
   i. $2x^3-3x^2-3x+2$ ii. $x^3-3x^2-10x+24$ iii. x^3-2x^2-5x+6
   iv. $4x^3-7x+3$ v. $x^3-23x^2+142x-120$ vi. x^3-7x+6
   vii. $x^3+13x^2+32x+20$ viii. $2x^3-9x^2+7x+6$ ix. x^3-10x^2-x+10
   x. $x^3-6x^2+11x-6$ xi. $x^3+6x^2+11x+6$ xii. $2x^3+11x^2-7x-6$
   xiii. $x^3-5x^2-2x+24$

3. Find the values of a and b if the following polynomials are perfect squares.
   i. $4x^4-12x^3+37x^2+ax+b$ ii. $x^4-4x^3+10x^2-ax+b$
   iii. $ax^4+bx^3+109x^2-60x+36$ iv. $ax^4-bx^3+40x^2+24x+36$

4. A rectangular field is 20m long and 14m wid. There is a path of equal width all around it having an area of 111sq.meters. Find the width if the path on the outside.

5. One year ago, a man was 8 times as old as his son. Now his age is equal to the square of his son's age. Find their present ages.

6. if $p = \frac{x}{x+y}$, $Q = \frac{y}{x+y}$ then find $\frac{1}{P-Q} - \frac{2q}{P^2-Q^2}$

7. Find the square root of the following polynomials by division method.
   i. $x^4-10x^3+37x^2-60x+36$ ii. $4x^4+8x^3+8x^2+4x+1$
   iii. $9x^4-6x^3+7x^2-2x+1$ iv. $4+25x^2-12x-24x^3+16x^4$
   v. $x^4-4x^3+10x^2-12x+9$ vi. $x^4-6x^3+19x^2-30x+25$

8. If $m-nx+28x^2+12x^3+9x^4$ is a perfect square, then find the values of m and n.

9. If α and β are the roots of $2x^2-3x-5=0$, form a quadratic equation whose roots are α^2 and β^2.
10. If α and β are the roots of $x^2-3x-1=0$, then form a quadratic equation whose roots are $\frac{1}{\alpha^2}$ and $\frac{1}{\beta^2}$.
11. If α and β are the roots of the equation $3x^2-6x+1=0$, form an equation whose roots are
    i. $\frac{1}{\alpha}, \frac{1}{\beta}$ ii. $\alpha^2\beta, \beta^2\alpha$ iii. $2\alpha+\beta, 2\beta+\alpha$
12. Find a quadratic equation whose roots are the reciprocal of the roots of the equation $4x^2-3x-1=0$
13. If α and β are the roots of the equation $3x^2-4x+1=0$, form a quadratic equation whose roots are $\frac{\alpha^2}{\beta}$ and $\frac{\beta^2}{\alpha}$
14. If α and β are the roots of the equation $3x^2-5x+2=0$, then find the values of
    i. $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}$ ii. $\alpha-\beta$ iii. $\frac{\alpha^2}{\beta}+\frac{\beta^2}{\alpha}$
15. The sum of a number and its reciprocate $\frac{65}{8}$ find the number

UNIT - 4
Matrices

Definitions :

Matrix : A matrix is a rectangular array of number in rows and columns enclosed within square brackets or parentheris.

Types of matrices :

i. Row matrix

A matrix is said to be a row matrix if it has only one row.

ii. Column matrix

A matrix is said to be a column matrix if it has only one column.

iii.Square Matrix

A Matrix in which the number of rows and the number of columns are equal is said to be a square matrix.

iv. Diagonal Matrix

A square matrix in which all the elements above and below the leading diagonal are equal to zero, is called a diagonal matrix.

v. Scalar Matrix

A diagonal matrix in which all the elements along the leading diagonal are equal to a non-zero constant is called a scalar matrix.

vi.Unit Matrix

A diagonal matrix in which all the leading diagonal entries are 1 is called a unit matrix.

vii.Null matrix or zero-matrix

A matrix is said to be a null matrix or zero-matrix if each of its elements is zero.

viii.Transpose of a matrix

The transpose of a matrix A is obtained by interchanging rows and columns of the matrxi A and it is denoted by A^T.

ix.Negative of a Matrix

The negative of a matrix $A=[a_{ij}]_{mxn}$ is denoted by -a and is defined as -A=(-1)A.

x. Equality of matrices :

Two matrices $A=[a_{ij}]_{mxn}$ and $B=[b_{ij}]_{mxn}$ are said to be

i. They are of the same order and

ii. each element of A is equal to the corresponding element of B, that is $a_{ij} = b_{ij}$ for all i and j.

xi. Addition or subtraction of two matrices are possible only when they are of same order.

xii: If $A = [a_{ij}]_{mxn}$ and $B=[b_{ij}]_{nxp}$ then the product matrix AB is defined and is of order mxp.

xiii:Properties of matrix addition

I. Matrix addition is Commutative A+B = B+A.
ii. Matrix addition is associative A+(B+C) = (A+B)+C
iii. Existence of additive identity A+O = O+A = A
iv. Existence of additive inverse A+(-A) = (-A)+A = o

xiv:Properties of matrix multiplication

I. Matrix multiplication is not commutative $AB \neq BA$.
ii. Matrix multiplication is always associative (AB)C = A(BC)
iii. Matrix multiplication is distributive over addition
   I. A(B+C) = AB+AC
   ii. (A+B)C = AC+BC
iv. Existence of multiplicative identity
   AI = IA = A.
v. Existence of multiplicative inverse
   AB = BA = I

xv: i. $(AT)^T = A$
ii. $(A+B)^T = A^T+B^T$
iii. $(AB)^T = B^T A^T$

One Mark Questions :

1. Which one of the following statement is not true?
   a. A scalar matrix is a square matrix.
   b. A diagonal matrix is a square matrix.
   c. A scalar matrix is a diagonal matrix.
   d. A diagonal matrix is a scalar matrix.
2. Matrix $A = [a_{ij}]$ is a square matrix if =
   a. $m \angle n$ b. $m > n$ c. $m = 1$ b. $m = n$
3. If $\begin{pmatrix} 3x+7 & 5 \\ y+1 & 2-3x \end{pmatrix} = \begin{pmatrix} 1 & y-2 \\ 8 & 8 \end{pmatrix}$ then the values of x and y?
4. If A = (1 -2 3) and B = $\begin{pmatrix} -1 \\ 2 \\ -3 \end{pmatrix}$ then A+B.
5. If a matrix is of order 2x3, then the number of element in the matrix is_____.
6. If $\begin{pmatrix} 8 & 4 \\ x & 8 \end{pmatrix} = 4\begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$ then the value of x is_____.
7. If A is of order 3x4 and B is of order 4x3, then the order of BA is_____.

8. If A x $\begin{pmatrix}1 & 1\\0 & 2\end{pmatrix}$ = (1 2) then the order of A is_____.
9. If A and B are square matrices such that AB = I and BA = I then B is_____.
10. If A=$\begin{pmatrix}1 & 2\\2 & 1\end{pmatrix}$ $\begin{pmatrix}x\\y\end{pmatrix}$ =$\begin{pmatrix}2\\4\end{pmatrix}$, then the values of x and y respectively are_____.
11. If $\begin{pmatrix}1 & -2\\-3 & 4\end{pmatrix}$ and A+B = O, then B is_____.
12. If A =$\begin{pmatrix}4 & -2\\6 & -3\end{pmatrix}$, then A^2 is_____.
13. A is of order mxn and B is of order p x q, addition of A and B is possible only if___.
14. If $\begin{pmatrix}a & 3\\1 & 2\end{pmatrix}$ $\begin{pmatrix}2\\-1\end{pmatrix}$ = $\begin{pmatrix}5\\0\end{pmatrix}$, then the values of a is_____.
15. If A =$\begin{pmatrix}\alpha & \beta\\\gamma & -\alpha\end{pmatrix}$, is such that A^2 = I, then_____.
16. If A = $[aij]_{2x2}$ and aij = i+j, then A = _____.
17. $\begin{pmatrix}-1 & 0\\0 & -1\end{pmatrix}$ $\begin{pmatrix}a & b\\c & d\end{pmatrix}$ = $\begin{pmatrix}1 & 0\\0 & -1\end{pmatrix}$, then the values of a, b, c and d respectively are_____.
18. If A =$\begin{pmatrix}7 & 2\\1 & 3\end{pmatrix}$ and A+B =$\begin{pmatrix}-1 & 0\\2 & -4\end{pmatrix}$ then the matrix Bis equal to_____.
19. If (5 x 1) $\begin{pmatrix}2\\-1\\3\end{pmatrix}$ = (20), then the value of x is_____.
20. Which one of the following is true for any two square matrices A and B of same order

    a. $(AB)^T = A^T B^T$ b. $(A^TB)^T = A^T B^T$ c. $(AB)^T = BA$ d. $(AB)^T = B^T A^T$

Two Mark Questions :

1. Construct a 2x3 matrix A = $[a_{ij}]$ whose elements are given by aij = | 2i - 3j |.
2. If A =$\begin{pmatrix}8 & 5 & 2\\1 & -3 & 4\end{pmatrix}$ then find A^T and $(A^T)^T$.
3. Construct a $2x^2$ matrix A=$[a_{ij}]$ whose elements are given by aij = $\frac{i-j}{i+j}$
4. A matrix consists of 30 elements. What are the possible orders it can have?
5. Construct a $3x^2$ matrix A=$[a_{ij}]$ whose elements are given by aij = $\frac{(i-2j)^2}{2}$
6. If A = $\begin{pmatrix}1 & 2 & 3\\2 & 4 & -5\\3 & -5 & 6\end{pmatrix}$ then verify that $(A^T)^T$ = A.
7. Find the values of x,y and z if $\begin{pmatrix}x & 5 & 4\\5 & 9 & 1\end{pmatrix}$ = $\begin{pmatrix}3 & 5 & z\\5 & y & 1\end{pmatrix}$
8. Solve : $\begin{pmatrix}y\\3x\end{pmatrix}$ = $\begin{pmatrix}6-2x\\31+4y\end{pmatrix}$
9. If A = $\begin{pmatrix}5 & 6 & -2 & 3\\1 & 0 & 4 & 2\end{pmatrix}$ and B = $\begin{pmatrix}3 & -1 & 4 & 7\\2 & 8 & 2 & 3\end{pmatrix}$ then find A+B.

10. Solve for x and y, if $\begin{pmatrix} 2x + y \\ x - 3y \end{pmatrix} = \begin{pmatrix} 5 \\ 13 \end{pmatrix}$

11. If $A = \begin{pmatrix} 4 & -2 \\ 5 & -9 \end{pmatrix}$ and $B = \begin{pmatrix} 8 & 2 \\ -1 & -3 \end{pmatrix}$ find 6A - 3B.

12. If $A = \begin{pmatrix} 3 & 2 \\ 5 & 1 \end{pmatrix}$; and $B = \begin{pmatrix} 1 & -2 \\ 2 & 3 \end{pmatrix}$ and $0 = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$ then verify

    (i) A+B = B+A (ii) A + (-A) = 0 = (-A) + A

13. If $A = \begin{pmatrix} 1 & 3 \\ 9 & -6 \end{pmatrix}$ then verify AI = IA = A, where I is the unit matrix of order 2.

14. Prove that $A = \begin{pmatrix} 5 & 2 \\ 7 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & -2 \\ -7 & 5 \end{pmatrix}$ are inverses to each other under matrix multiplication.

15. Find the product of the matrices $\begin{pmatrix} 3 & -2 \\ 5 & 1 \end{pmatrix} \begin{pmatrix} 4 & 1 \\ 2 & 7 \end{pmatrix}$

16. Find the values of x and y if $\begin{pmatrix} 1 & 2 \\ 3 & 3 \end{pmatrix} \begin{pmatrix} x & o \\ o & y \end{pmatrix} = \begin{pmatrix} x & o \\ q & o \end{pmatrix}$

17. If $A = \begin{pmatrix} 3 & 2 \\ 5 & 1 \end{pmatrix}$; and $B = \begin{pmatrix} 8 & -1 \\ 4 & 3 \end{pmatrix}$ Find the matrix C if C = 2 A + B

18. If $A = \begin{pmatrix} 2 & 3 \\ -9 & 5 \end{pmatrix} - \begin{pmatrix} 1 & 5 \\ 7 & -1 \end{pmatrix}$ then Find the addictive inverse of A.

Five Mark Questions :

1. Find x and y if $2x+3y = \begin{pmatrix} 2 & 3 \\ 4 & 0 \end{pmatrix}$, and $3x+2y = \begin{pmatrix} 2 & -2 \\ -1 & 5 \end{pmatrix}$
2. If $A = \begin{pmatrix} 4 & 1 & 2 \\ 1 & -2 & 3 \\ 0 & 3 & 2 \end{pmatrix}$; $B = \begin{pmatrix} 2 & 0 & 4 \\ 6 & 2 & 8 \\ 2 & 4 & 6 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 2 & -3 \\ 5 & 0 & 2 \\ 1 & -1 & 1 \end{pmatrix}$ then verify that A+(B+C)=(A+B)+C.
3. Find the values of x and y $\begin{pmatrix} 3 & 2 \\ 4 & 5 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 8 \\ 13 \end{pmatrix}$
4. If $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and $I_2 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ then show that A^2- (a+d) A = (bc-ad) I_2.
5. If $A = \begin{pmatrix} 3 & 2 \\ -1 & 4 \end{pmatrix}$; $B = \begin{pmatrix} -2 & 5 \\ 6 & 7 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 1 \\ -5 & 3 \end{pmatrix}$ verify that A (B+C) = AB+AC.
6. If $A = \begin{pmatrix} 5 & 2 \\ 7 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ -1 & 1 \end{pmatrix}$ verify that $(AB)^T = B^T A^T$.

7. If $A = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$ then show that $A^2-4A+5I_2=0$.

8. If $A = \begin{pmatrix} -2 \\ 4 \\ 5 \end{pmatrix}$ and B = (1 3 -6) then verify that $(AB)^T = B^TA^T$.

9. If $A = \begin{pmatrix} -1 & 2 & 1 \\ 1 & 2 & 3 \end{pmatrix}$; $B = \begin{pmatrix} 0 \\ 1 \\ 2 \end{pmatrix}$ and C = (2 1) verify that (AB) C = A(BC).

10. Solve (x 1) $\begin{pmatrix} 1 & 0 \\ -2 & -3 \end{pmatrix} \begin{pmatrix} x \\ 5 \end{pmatrix} = 0$.

11. Find a and b if $a\begin{pmatrix} 2 \\ 3 \end{pmatrix} + b\begin{pmatrix} -1 \\ 1 \end{pmatrix} = \begin{pmatrix} 10 \\ 5 \end{pmatrix}$

12. If $A = \begin{pmatrix} 1 & -4 \\ -2 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & 6 \\ 3 & -2 \end{pmatrix}$ then P.T. $(A+B)^2 \neq A^2 + 2AB + B^2$

UNIT - 5 : COORIDINATE GEOMETRY

1. Distance between two points. $d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

2. The point P which divides the line segment joining the two points A(x_1,y_1) and B(x_2,y_2) in the ratio l;m is

   Section Formula

   (i) internally $P\left(\frac{lx_2+mx_1}{l+m}, \frac{ly_2+my_1}{l+m}\right)$

   (ii) externally $P\left(\frac{lx_2-mx_1}{l-m}, \frac{ly_2-my_1}{l-m}\right)$

3. The midpoint of the line segment joining the points $A(x_1, y_1)$ and $B(x_2, y_2)$ in $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

4. The centroid of the triangle whose vertices are (x_1,y_1), (x_2,y_2) and (x_3,y_3) is $\left(\frac{x_1+x_2+x_3}{2}, \frac{y_1+y_2+y_3}{3}\right)$

5. If A (x_1,y_1), B(x_2,y_2) and C(x_3,y_3) are the vertics of a Δ ABC

than the area of a Δ ABC = $\frac{1}{2}\left[(x_1y_2+x_2y_3+x_3y_1) - (x_2y_1+x_3y_2+x_1y_3)\right]$ sq.units

(or)

Area of ΔABC = $\frac{1}{2}\begin{bmatrix} x_1 & x_2 & x_3 & x_1 \\ y_1 & y_2 & y_3 & y_1 \end{bmatrix}$ squints

6. If A (x_1,y_1), B(x_2,y_2), C(x_3,y_3) are three points. The three points are collinear then

(i) Area of Δ ABC = 0

(ii) $x_1y_2+x_2y_3+x_3y_1 = x_2y_1+x_3y_2+x_1y_3$

(iii)Slope of AB = slope of AC

7. Area of the quadrilateral = $\frac{1}{2}\left[(x_1y_2+x_2y_3+x_3y_4+x_4y_1) - (x_2y_1+x_3y_2+x_4y_3+x_1y_4)\right]$ sq.units

(or)

Area of the quadrilateral = $\frac{1}{2}\begin{bmatrix} x_1 & x_2 & x_3 & x_4 & x_1 \\ y_1 & y_2 & y_3 & y_4 & y_1 \end{bmatrix}$ sq.units

Angle of inclination

8. If θ is the angle of inclination of a straight line l, then $0^\circ \le \theta \le 180^\circ$

9. For horizontal lines, $\theta = 0^\circ$ or 180° and for vertical lines, $\theta = 90^\circ$

Slope of a straight line

10. The slope of the straight line, m = tan θ for $0^\circ \le \theta \le 180^\circ$, $\theta \ne 90^\circ$

11. The lope of x - axis or straight lines parallel to x-axis is zero.

12. The slope of y-axis or a straight line parallel to y-axis is not defined because tan 90° is not defined.

13. If θ is acute, then the slope is positive If θ is obtuse, then the slope is negative Slope

14. The Slope of the line l is m = tan

15. The slope of the straight line joining the points (x_1,y_1) and (x_2, y_2) is

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

16. If a straight line ax + by + c = 0, then the slope $m = \frac{-a}{b} = \frac{\text{co.eff. of x}}{\text{co.eff. of y}}$

17. If two straight lines are parallel, then their slopes are equal ($m1 = m2 \Rightarrow \tan\theta 1, = \tan\theta 2$)

18. If two straight lines are perperdicular, then $m_1 \times m_2 = -1$

Equation of a straight line

19. The equation of x-axis is y = 0
The equation of y-axis is x = 0

20. i)The equation of a straight line parallel to y-axis is x = c (where c is a constant)
ii)The equation of a straight line parallel to x-axis is x = k (k is a constant)

21. The equations of all lines parallel to the line ax + by + c = 0 are of the form
ax + by + k = 0

22. The equations of all lines perperdicular to the line ax + by + c = 0 are bx - ay + k = 0

23. Passing through the orgin, then equation is y = mx

24. Slope m, y - intercept c, then the equation is y = mx + c

Slope m, a point (x_1, y_1) then the equation is y - y1 = m (x-x1)

25. Passing through two points (x_1, y_1), (x_2, y_2) then the equation is $\frac{y - y_1}{y_2 - y_1} = \frac{x - x_1}{x_2 - x_1}$

26. x - intercept a, y - intercept b then the equation is $\frac{x}{a} + \frac{y}{b} = 1$

One Mark Equations:

1. The midpoint of the line joining (a, -b) and (3a, 5b) is _____
2. The point P which divides the line segment joining the points A(1, -3) and B(-3, 9) internally is the ratio 1 : 3 is _____
3. If the line segment joining the point A(3, 4) and B(14, -3) meets the x-axis at P, then the ratio in which P divides the segment AB is _____
4. The Centroid of the triangle with vertices at (-2, -5), (-2, 12) and (10, -1) is _____
5. If (1, 2), (4, 6), (x, 6) and (3, 2) are the vertices of a parallelogram taken in order, then the value of x is _____
6. Area of the triangle formed by the points (0, 0), (2, 0) and (0, 2) is ____
7. Area of the quadrilateral formed by the points (1, 1), (0, 1), (0, 0)and (1, 0) is ____
8. The Angle of inclination of a straight line parallel to x - axis is equal to ____
9. Slope of the line joining the points (3, -2) and (-1, a) is $-\frac{3}{2}$, then the value of a is _____
10. Slope of the straight line which is perpendicular to the straight line joining the Points (-2, 6) and (4, 8) is _____
11. The point of intersection of the straight lines 9x - y - 2 = 0 and 2x + y - 9 = 0 is ____
12. The Straight line 4x + 3y - 12 = 0 intersects the y - axis at _____
13. The Slope of the straight line 7y - 2x = 11 is equal to _____
14. The equation of a straight line passing through the point (2, -7) and parallel to x - axis is _____
15. The x and y - intercepts of the line 2x - 3y + 6 = 0, respectively are ____
16. The centre of a circle is (-6, 4). If One end of the diameter of the circle is at (-12, 8), then the other end is at _____

17. The equation of the straight line passing through the origin and perpendicular to the straight line $2x + 3y - 7 = 0$ is _____

18. The equation of a straight line parallel to y - axis and passing through the point (-2, 5) is _____

19. If the points (2, 5), (4, 6) and (a, a) are collinear, then the value of a is _____

20. If a straight line $y = 2x + k$ passes through the point (1, 2), then the value of K is _____

21. The equation of a straight line having slope 3 and y-intercept -4 is _____

22. The point of intersection of the straight lines $y = 0$ and $x = -4$ is _____

23. The value of K if the straight lines $3x + 6y + 7 = 0$ and $2x + KY = 5$ are perpendicular is _____

TWO MARK QUESTIONS :

1. Find the midpoint of the line segment joining the points (3, 0) and (-1, 4)

2. Find the point which divides the line segment joining the points (3, 5) and (8, 10) internally in the ratio 2 : 3

3. Fine the point which divides the line segment joining (3, 4) and (-6, 2) in the ratio 3 : 2 externally

4. The centre of a circle is at (-6, 4). If one end of a diameter of the circle is at the origin, then find the other end.

5. Find the area of the Δ ABC whose vertices are (1, 2), (-3, 4) and (-5, -6).

6. Find the slope of the straight line passing through the points (3, -2), (-1, 4)

7. Find the angle of inclination of the line passing through the points (1, 2) and (2, 3)

8. Find the equation of straight line whole angle of inclination is 45° and y - intecept is 2/5

9. Find the equation of the straight line passing through the point (-2, 3) with slope 1/3

10. Find the equation of the straight line passing through the points (-1, 1) and (2, -4)

11. Show that the straight line 3x + 2y - 12 = 0 and 6x + 4y + 8 = 0 are parallel

12. Find the equation of the straight line parallel to the line x - 8y + 13 = 0 and passing through the point (2, 5)

13. Show that the straight lines 3x - 5y + 7 = 0 and 15x + 9y + 4= 0 are perpendicular

14. Find the equation of the straight line perpendicular of the straight line x - 2y + 3 = 0 and passing through the point (1, -2)

15. Find the centroid of the triangle whose vertices are A(1, 3), B(2, 7) and C(12, -16)

16. If the area of the Δ ABC is 68 sq.cm and the vertices are A(6, 7), B(-4,1) and C(a, -9) taken in order, then find the value of a.

17. Show that the points are collinear A(4, 3), B(1, 2) and (-2, 1)

18. Find the slope and y - intercept :
    (i) y = x + 1, (ii) 4x - 2y + 1 = 0 (iii) 10x + 15y + 6 = 0.

19. Find the equation of the straight line whose x and y intercepts are given by:

    (i) 2, 3 (ii) $\frac{-1}{3}, \frac{3}{2}$ (iii) $\frac{2}{5}, \frac{-3}{4}$ (iv) $\frac{2}{3}, \frac{3}{4}$

20. Find the x and y intercepts if the straight line:

    (i) 5x + 3y - 15 = 0 (ii) 2x - y +16 = 0 (iii) 3x + 10y + 4 =0

21. If (7, 3), (6, 1), (8, 2) and (P, 4) are the vertices of a parallelogram taken in order, then find the value of P.

Five Mark Questions

1. Using the section formula, show that A(1, 0), B(5, 3), C(2, 7) and D(-2, 4) are the vertices of a parallelogram taken in order.

2. Using the concept of slope, show that the points (-2, -1), (4, 0), (3, 3), (-3, 2) taken in order form a parallelogram

3. If (a, 1), (1, 2) and (0, b + 1) are collinear then show that $\frac{1}{a} + \frac{1}{b} = 1$.

4. Using the concept of slope, show that the points (1, 2), (-2, 2), (-4, -3) and (-1, -3) taken in order form a parallelogram

5. Show that the opposite sides of a quadrilateral with vertices A(-2, -4), B(5, -1), C(6, 4) and D(-1, 1) taken in order are parallel.

6. Find the area of the quadrilateral whose vertices are:

   i) (6, 9), (7, 4), (4,2) and (3, 7) ans : 17 sq.units

   ii) (-3, 4), (-5, -6), (4, -1), (1, 2) ans : 43 sq.units

   iii) (-4, 5), (0, 7), (5, -5), (-4, -2) ans : 60.5 sq.units

   iv) (-4, -2), (-3, -5), (3, -2), (2, -3) ans : 28 sq.units

7. The vertices of a Δ ABC are A(2, 1), B(-2, 3), C(4, 5). Find the equation of the Median through the vertex A.

8. If the vertices of a Δ ABC are A(2, -4), B(3, 3) and C(-1, 5). Find the equation of the straight line along the altitude from the vertex 'B'.

9. If the vertices of a Δ ABC are A(-4, 4), B(8, 4) and C(8, 10). Find the equation of stiline along the median from the vertex 'A'.

10. Find the equation of the perpendicular bisector of the straight line segment joining the points (3, 4) and (1, -2)

11. The Vertices of a Δ ABC are A(2, 1), B(-2, 3) and C(4, 5) find the equation of the median through the vertex A

12. Find the equation of the straight line which passes through the point of intersection of the straight lines $5x - 6y = 1$ and $3x + 2y + 5 = 0$ and is perpendicular to the straight line $3x - 5y + 11 = 0$

Unit - 6
Geometry

1. Basic proportionality theorem or Thales Theorem
   If a straight line is drawn parallel to one side of a triangle intersecting the other two sides, then it divides the two sides in the same ratio.

2. Converse of Basic proportionality theorem or Converse of Thales Theorem
   If a straight line divides any two sides of a triangle in the same ratio, then the line must be parallel to the third side.

3. Angle Bisector Theorem
   The internal (external) bisector of an angle of a triangle divides the opposite side internally (externally) in the ratio of the corresponding sides containing the angle.

   Similar triangle
   Two triangles are similar if
   (i) their corresponding angles are equal (or)
   (ii) their corresponding sides have lengths in the same ratio (or proportional), which is equivalent to saying that one triangle is an enlargement of other,

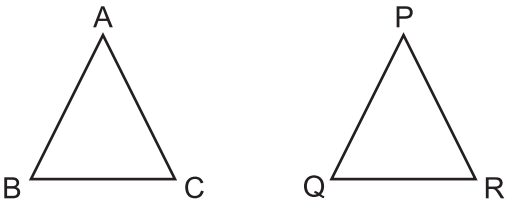
   Criteria for similarity of triangles
   (i) AA (Angle - Angle) similarity criterion
   If two angles of one triangle are respectively equal to two angles of another triangle, then the two triangles are similar.

   (ii) SSS (Side - Side - Side) Similarity criterion for two triangles
   In two triangles, if the sides of one triangle are proportional (in the same ratio) to the sides of the other triangle, then their corresponding angles are equal and hence the two triangles are similar

   (iii) SAS (Side - Angle - Side) Similarity Criterion for two triangles
   If one angle of a triangle is equal to one angle of the other triangle and if the corresponding sides including these angles are proportional, then the two triangles are similar.

Note

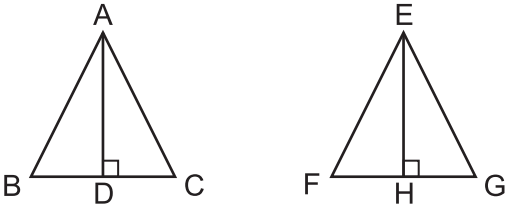
(I) the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides



If $\Delta ABC \sim \Delta PQR$

then $\frac{\Delta ABC}{\Delta PQR} = \frac{AB^2}{PQ^2} = \frac{AC^2}{PR^2} = \frac{BC^2}{QR^2}$

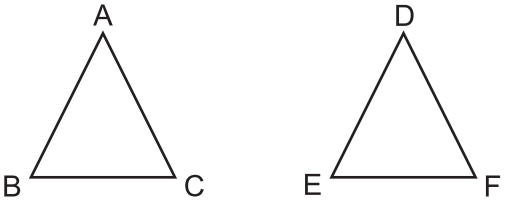
(ii) if two triangles are similar, then the ratio of the corresponding sides is equal to the ratio of their corresponding altitudes



If $\Delta ABC \sim \Delta EFG$,

then $\frac{AB}{EF} = \frac{BC}{FG} = \frac{CA}{GE} = \frac{AD}{EH}$

(iii) if two triangles are similar, then the ratio of the corresponding sides is equal to the ratio of the corresponding perimeters



If $\Delta ABC \sim \Delta DEF$

then $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD} = \frac{AB + BC + CA}{DE + EF + FD}$

Pythagoras theorem (Baudhayar theorem)

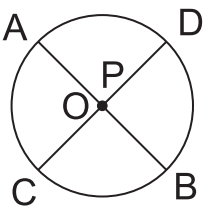
In a right angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Tangent - Chord Theorem

If from the point of contact of tangent (of a circle), a chord is drawn, then the angle which the choral makes with the tangent line are equal respectively to the angles formed by the chord in the corresponding alternate segments.

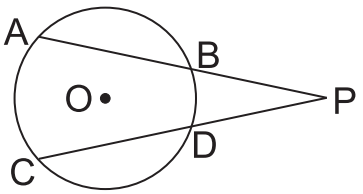
Note

(I) Two chords AB and CD intersect at P inside the circle with centre at O.



PA x PB = PC x PD

(ii) The chords AB and CD intersect at P out side the circle with centre O



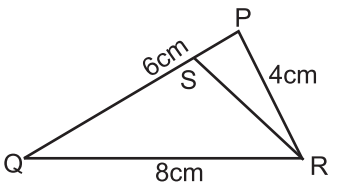
PA x PB = PC x PD

One Mark Question :

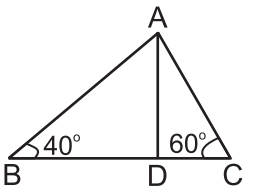
1. If a straight line intersects the sides AB and AC of a ΔABC at D and E respectively and is parallel to BC, then $\frac{AE}{AC}$ = _____

2. In Δ ABC, DE is parallel to BC,, meeting AB and AC at D and E, If Ad = 3cm, DB = 2cm and AE = 2.7 cm, then AC is equal to _____

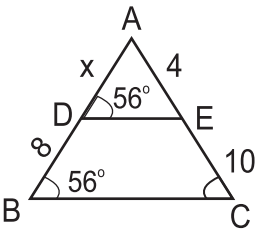
3. In ΔPQR, RS is the bisector of $\angle R$, If PQ = 6cm, QR = 8 cm, RP = 4 cm then PS is equal to _____



4. In figure, if $\frac{AB}{AC} = \frac{BD}{DC}$ $\angle B = 40^\circ$, and $\angle C = 60^\circ$, then $\angle BAD$ = _____



5. In the figure, the value, x is equal to _____



6. In triangles ABC and DEF, $\angle B = \angle E$, $\angle C = \angle F$ then _____

(A) $\frac{AB}{DE} = \frac{BC}{EF}$ (B) $\frac{BC}{EF} = \frac{AB}{FD}$ (C) $\frac{AB}{DE} = \frac{BC}{EF}$ (D) $\frac{CA}{FD} = \frac{AB}{EF}$

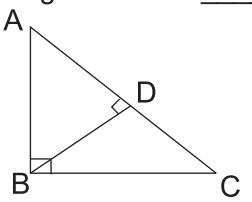
7. From the given figure, identify the wrong statement _____

   (A) Δ ADB ~ Δ ABC

   (B) Δ ABD ~ Δ ABC

   (C) Δ BDC ~ Δ ABC

   (D) Δ ADB ~ Δ BDC



8. If a vertical stick 12m long casts shadow 8m long on the ground and at the same time a tower casts a shadow 40m long on the ground, then the hight of the tower is _____

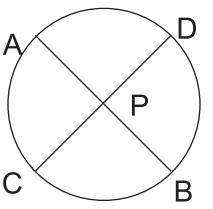
9. The sides of two similar triangles are in the ratio 2 : 3, then their areas are in the ratio _____

10. Triangles ABC and DEF are similar. If their areas are 100 cm^2 and 49 cm^2 respectively and BC is 8.2 cm then EF = _____

11. The perimeters of two similar triangles are 24cm and 18 cm respectively. If one side of the first triangle is 8cm, then the corresponding side of the other triangle is _____

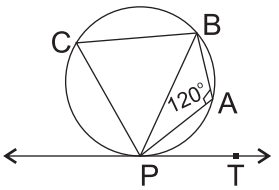
12. AB and CD are two chords of a circle which when produced to meet at a point P such that AB = 5cm, AP = 8cm. and CD = 2cm then PD = _____

13. In the adjoining figure, chords AB and CD intersect at P, If AB = 16cm, PD = 8cm, PC = 6cm and AP>PB, then AP = _____



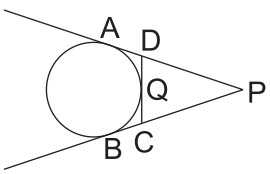
14. A point P is 26cm away from the centre O of a circle and PT is the tangent drawn from P to the circle is 10cm, then OT is equal to _____

15. In the figure, if $\angle PAB = 120^\circ$, then $\angle BPT$ =



16. If the tangents PA and PB from an external point P to circle with centre O are inclined to each other at an angle of 40° then $\angle POA$ =

17. In the figure, PA and PB are tangents to the circle drawn from an external point P. Also CD is a tangent to the circle at Q. If PA = 8cm and CQ = 3cm, then PC is equal to _____



18. Δ ABC is a right angled triangle where $\angle B = 90^\circ$ and BD $\perp$ AC. If BD = 8cm, AD = 4cm, then CD is _____

19. The areas of two similar triangles are 16cm2 and 36cm2 respectively. If the altitude of the first triangle is 3cm, then the corresponding altitude of the other triangle is _____

20. The perimeter of two similar triangles ΔABC and ΔDEF are 36cm and 24cm respectively. If DE = 10cm, then AB is _____

Two Mark Questions

1. State pythagoras Theorem?

2. In Δ ABC, DE $\parallel$ BC and $\frac{AD}{DB} = \frac{2}{3}$. If AE = 3.7cm find EC

3. In a ∆ABC, D and E are points on the sides AB and AC respectively such that DE||BC.
   i) If AD = 6cm, DB = 9cm and AE = 8cm, then find AC
   ii) If AD = 8cm, AB = 12cm and AE = 12cm, then find CE

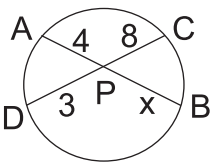
4. In ∆ ABC, t he internal bisector AD of $\angle A$ meet the side BC at D.
   If BD = 2.5cm, AB = 5cm and AC = 4.2cm , then find DC

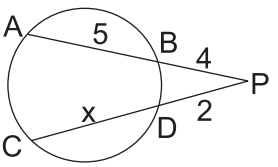
5. In ∆ABC, AE the external bisector of $\angle A$ meeting BC produced at E. If AB = 10cm, AC = 6cm and BC = 12cm then find CE.

6. In a ∆ABC, AD is the internal bisector of $\angle A$ meeting BC at D.
   i) If BD = 2cm, AB = 5cm, DC = 3cm find AC.
   ii) If AB = 5.6cm, AC = 6cm, DC = 3cm find BC.

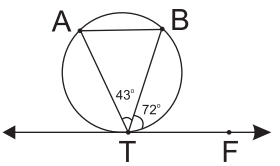
7. Let PQ be a tangent to a circle at A and AB be a chord. Let C be a point on the circle such that $\angle BAC = 54^\circ$ and $\angle BAQ = 62^\circ$, find $\angle ABC$.

8. Find the value of x in each of the following diagrams.





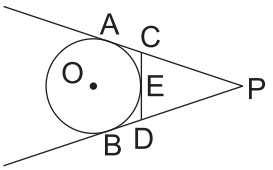
9. In the figure, TP is a tangent to a tangent to a circle. A and B are two points on the circle. If $\angle BTP = 72^\circ$ and $\angle ATB = 43^\circ$ find $\angle ABT$



10. AB and CD are two chords of a circle which intersect each other internally at P.
    i) If CP = 4cm, AP = 8cm and PB = 2cm then find PD
    ii) If AP = 12cm, AB = 15cm and CP = PD then find CD.

11. AB and CD are two chords of a circle which intersect each other internally at P.
    i) If AB = 4cm, BP = 5cm and PD = 3cm then find CD
    ii) If BP = 3cm, CP = 6cm and CD = 2cm then find AB

12. In the figure, tangents PA and PB are drawn to a circle with centre O from an external point P. If CD is a tangent to the circle at E and AP = 15cm, find the perimeter of Δ PCD



Five Mark Questions

1. State and prove thales theorem. (or) Basic Proportionality theorem.

2. State and prove Angle Bisector theorem.

3. State and prove Pythagoras theorem.

4. A point O in the interior of a rectangle ABCD is joined to each of the vertices A, B, C and D. Prove that $OA^2 + OC^2 = OB^2 + OD^2$

5. ABCD is a quadrilateral such that all if its sides touch a circle. If AB = 6cm, BC = 6.5cm, CD = 7cm, then the length of AD

6. If all stles of a parallelogram touch a circle show that the parallelogram is a rhombus

UNIT : 7 : TRIGONOMETRY

Trigonometry identities

$\sin\theta = \frac{\text{Opp. side}}{\text{hyp}}$ | $\text{Cosec}\,\theta = \frac{\text{hyp}}{\text{Opp. side}}$

$\cos\theta = \frac{\text{adj. side}}{\text{hyp}}$ | $\sec\theta = \frac{\text{hyp}}{\text{adj. side}}$

$\tan\theta = \frac{\text{Opp. side}}{\text{adj. side}}$ | $\cot\theta = \frac{\text{adj. side}}{\text{Opp. side}}$

$\sin\theta = \frac{1}{\text{Cosec}\,\theta}$ | $\text{Cosec}\,\theta = \frac{1}{\sin\theta}$ | $\tan\theta = \frac{\sin\theta}{\cos\theta}$

$\cos\theta = \frac{1}{\sec\theta}$ | $\sec\theta = \frac{1}{\cos\theta}$ | $\cot\theta = \frac{\cos\theta}{\sin\theta}$

$\tan\theta = \frac{1}{\cot\theta}$ | $\cot\theta = \frac{1}{\tan\theta}$

θ	$0°$	$30°$	$45°$	$60°$	$90°$
$\sin\theta$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan\theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	∞
$\text{cosec}\,\theta$	∞	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
$\sec\theta$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	∞
$\cot\theta$	∞	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

Identity

1. $\sin^2\theta + \cos^2\theta = 1$

   $\Longrightarrow \sin^2\theta = 1 - \cos^2\theta$

   $\Longrightarrow \cos^2\theta = 1 - \sin\theta$

2. $1 + \tan^2\theta = \sec^2\theta$

   $\Longrightarrow \sec^2\theta - \tan^2\theta = 1$

   $\Longrightarrow \tan^2\theta = \sec^2\theta - 1$

3. $1 + \cot^2\theta = \operatorname{cosec}^2\theta$

   $\Longrightarrow \operatorname{cosec}^2\theta - \cot^2\theta = 1$

   $\Longrightarrow \cot^2\theta = \operatorname{cosec}^2\theta - 1$

$\sin\theta = \cos(90° - \theta)$
$\cos\theta = \sin(90° - \theta)$
$\tan\theta = \cot(90° - \theta)$

$\operatorname{cosec}\theta = \sec(90° - \theta)$
$\sec\theta = \operatorname{cosec}(90° - \theta)$
$\cot\theta = \tan(90° - \theta)$

One Mark questions :

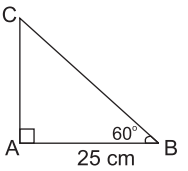
1. $(1 - \sin^2\theta)\sec^2\theta =$ _____
2. $(1 + \tan^2\theta)\sin^2\theta =$ _____
3. $(1 - \cos^2\theta)(1 + \cot^2\theta) =$ _____
4. $\sin(90° - \theta)\cos\theta + \cos(90° - \theta)\sin\theta =$ _____
5. $1 - \frac{\sin^2\theta}{1 + \cos\theta} =$ _____
6. $\cos^4 x - \sin^4 x =$ _____
7. If $\tan\theta = \frac{a}{x}$, then the value of $\frac{x}{\sqrt{a^2 + x^2}} =$ _____
8. If $x = a\sec\theta$, $y = b\tan\theta$, then the value of $\frac{x^2}{a^2} - \frac{y^2}{b^2} =$ _____

9. $\frac{\sec\theta}{\cot\theta + \tan\theta}$ = _____

10. $\frac{\sin(90° - \theta)\sin\theta}{\tan\theta} + \frac{\cos(90° - \theta)\cos\theta}{\cot\theta}$ = _____

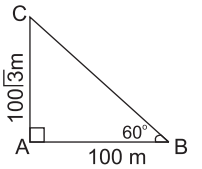
11. In the adjoining figure

AC = _____



12. In the adjoining figure

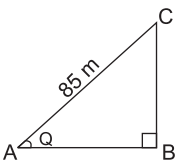
$\angle ABC$ = _____



13. A man is 28.5 m away from a tower. His eye level above the ground is 1.5m. The angle of elevation of the tower from his eyes is 45°. Then the height of the tower is _____

14. In the adjoining figure

$\sin\theta = \frac{15}{17}$, then BC _____



15. $(1+\tan^2\theta)(1-\sin\theta)(1+\sin\theta)$ = _____

16. $(1+\cot^2\theta)(1-\cos\theta)(1+\cos\theta)$ = _____

17. $(\cos^2\theta - 1)(\cot^2\theta + 1) + 1$ = _____

18. $\frac{1 + \tan^2 \theta}{1 + \cot^2 \theta}$ = _____

19. $\sin^2 \theta + \frac{1}{1 + \tan^2 \theta}$ = _____

20. $9 \tan^2 \theta - 9 \sec^2 \theta$ = _____

Two mark questions

Prove that the following

1. $\frac{\sin \theta}{\text{cosec } \theta} + \frac{\cos \theta}{\sec \theta} = 1$

2. $\sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}} = \text{cosec } \theta - \cot \theta$

3. $\sin^6 \theta + \cos^6 \theta = 1 - 3\sin^2 \theta \cos^2 \theta$

4. $\sqrt{\frac{1 - \sin \theta}{1 + \sin \theta}} = \sec \theta - \tan \theta$

5. $\frac{1 + \sec \theta}{\sec \theta} = \frac{\sin^2 \theta}{1 - \cos \theta}$

6. Determine whether each of the following is an identity or not

   (i) $\cos^2 \theta + \sec^2 \theta = 2 + \sin \theta$

   (ii) $\cot^2 \theta + \cos \theta = \sin^2 \theta$

7. A ladder leaning against a vertical wall, makes an angle of 60° with the ground. The foot of the ladder is 3.5m away from the wall. Find the length of the ladder.

8. Find the angular elevation (angle of elevation from the ground level) of the sun when the length of the shadow of a 30m long pole is $10\sqrt{3}$ m

9. A ramp for unloading a moving truck, has an angle of elevextion of 30°. If the top of the ramp is 0.9m above the ground level, then find the length of the ramp.

10. A girl of height 150cm stands in front of a lamp - post and casts a shadow length $150\sqrt{3}$cm on the ground. Find the angle of elevation of the top of the lamp - point

11. A simple pendulum of length 40cm subtends 60o at the vertex in one full oscillation. What will be true shortest distance between the initial position and the final position of the bob?

12. A kite is flying with a string of length 200m. If the thread makes an angles 30° with the ground. Find the distance of the kite from the ground level

Five Mark Question

Prove the identify

1. $(\sec\theta + \text{cosec}\,\theta)^2 + (\cos\theta + \text{cosec}\,\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$

2. From the top and foot of a 40m high tower, the angles of elevation of the top of a lighthouse are found to be 30° and 60° respectively. Find the height of the lighthouse. Also find the distance of the top of the lighthouse from the foot of the tower.

3. A vertical wall and a tower are on the ground. As seen from the top of the tower, the angles of depression of the top and bottom of the wall are 45° and 60° respectively. Find the height of the wall if the height of the tower is 90 m.($\sqrt{3}$ = 1.732)

4. A flag post stands on the top of a building. From a point on the ground, the angles of elevation of the top and bottom of the flag post are 60° and 45° respectively. If the height of the flag post is 10m, find the height of the building.($\sqrt{3}$ = 1.732)

5. A person in an helicopter flying at a height of 700m, observes two objects flying opposite to each other on either bank of a river. The angles of depression of the objects are 30° and 45°. Find the width of the river ($\sqrt{3}$ = 1.732)

6. From the top of a tower of height 60m, the angles of depression of the top and the bottom of a building are observed to be 30° and 60° respectively. Find the height of the building.

7. A boy is standing at some distance from a 30m tall building and his eye level from the ground is 1.5m. The angle of elevation from his to the top of the building increases from 30° to 60° as he walks towards the building. Find the distance he walked towards the building.

8. A student sitting in a classroom sees a picture on the black board at a height of 1.5m from the horizontal level of sight. The angle of elevation of the picture is 30°. As the picture is not clear to him, he moves straight towards the black board and sees the picture at an angle of elevation of 45°. Find the distance moved by the student.

9. If $x = a \sec\theta + b \tan\theta$ and $y = a \tan\theta + b \sec\theta$ then prove that $x^2 - y^2 = a^2 - b^2$.

10. If $\tan\theta + \sin\theta = m$, $\tan\theta - \sin\theta = n$ and $m \neq n$, then show that $m^2 - n^2 = 4\sqrt{mn}$

UNIT : 8 : MENSURATION

Sl No.	Name	Lateral or curved surface Area (sq.units)	Total surface Area (sq.units)	Volume (cu.units)
1	Solid right circular cylinder	$2\pi rh$	$2\pi r (h + r)$	$\pi r^2 h$
2	Right circular hollow cylinder	$2\pi h (R+r)$	$2\pi (R+r) (R - r + h)$	$\pi h (R+r) (R- r)$
3	Solid right circular cone	$\pi r\ell$	$\pi r (\ell + r)$	$1/3\ \pi r^2 h$
4	Frustum	-	-	$1/3\ \pi h (R^2 + r^2 + Rr)$
5	Sphere	$4\pi r^2$	$4\pi r^2$	$4/3\ \pi r^3$
6	Hollow Sphere	-	-	$4/3\ \pi (R^3 - r^3)$
7	Solid Hemisphere	$2\pi r^2$	$3\pi r^2$	$2/3\ \pi r^3$
8	Hollow Hemisphere	$2\pi (R^2 + r^2)$	$\pi (3R^2 + r^2)$	$2/3\ \pi (R^3 - r^3)$

Cone :

Slant height $\ell = \sqrt{h^2 + r^2}$

height $h = \sqrt{\ell^2 - r^2}$

radius $r^1 = \sqrt{\ell^2 - h^2}$

curved surface Area of the cone = Area of the sector $\pi r\ell = \frac{\theta}{360} \times \pi r^2$

1 - mark questions :

1. The curved surface area of a right circular cylinder of radius 1cm and height 1cm is equal to _____

2. The total surface area of a solid right circular cylinder whose radius is half of its height h is equal to _____

3. Base area of a right circular cylinder is $80cm^2$. If its height is 5cm, then the volume is equal to _____

4. If the total surface area of a solid right circular cylinder is $200\pi cm^2$ and its radius is 5cm, then the sum of its height and radius is _____

5. The curved surface area of a right circular cylinder whose radius is a units and height is 'b' units, is equal to _____

6. Radius and height of a right circular cone and that of 'a' right circular cylinder are respectively, equal. If the volume of the cylinder is $120cm^3$, then the volume of the cone is equal to ____

7. If the diameter and height of a right circular cone are 12cm and 8cm respectively, then the slant height is _____

8. If the circumfernce at the base of a right circular cone and the slant height are $120\pi cm$ and 10cm respectively, then the curved surface area of the cone is equal to _____

9. If the volume and the base area of a right circular cone are $48\pi cm^3$ and $12\pi cm^2$ respectively, then the height of the cone is equal to _____

10. If the height and the base area of a right circular cone are 5cm and 48sq.cm respectively, then the volume of the cone is equal to _____

11. The ratios of the respective heights and the respective radii of two cylinders are 1 : 2 and 2 : 1 respectively then the respective volumes are in the ratio is _____

12. If the radius of a sphere is 2cm, then the curved surface area of the sphere is equal to _____

13. The total surface area of a solid hemisphere of diameter 2cm is equal to _____

14. If the volume of a sphere is $\frac{9}{16}\pi$ cu.cm, then its radius is _____

15. The surface areas of two spheres are in the ratio of 9 : 25. Then their volumes are in the ratio _____

16. The total surface area of a solid hemisphere whose radius is 'a' units, is equal to _____

17. If the surface area of a sphere is $100\pi\ cm^2$, then its radius is equal to _____

18. If the surface area of a sphere is $36\pi\ cm^2$, then the volume of the sphere is equal to _____

19 If the total surface area of a solid hemisphere is $12\pi\ cm^2$, then its curved surface area is equal to _____

20. If the radius of a sphere is half of the radius of another sphere, then their respective volumes are in the ratio _____

21. Curved surface area of solid sphere is $24cm^{2.}$ If the sphere is divided into two hemisphere, then the total surface area of one of the hemisphere is _____

22. Two right circular cones have equal radii. If their slant heights are in the ratio 4 : 3 then their respective curved surface areas are in the ratio _____

2 Marks Questions :

1. A solid right circular cylinder has radius 7cm and height 20cm. Find its (i) curved surface area and (ii) total surface area ($\pi = \frac{22}{7}$)
2. A solid right circular cylinder has radius 14cm and height 8cm. Find its curved surface area and total surface area
3. The total surface area of a solid right circular cylinder is 660 sq.cm. If its diameter of the base is 14cm. Find the height and curved surface area of the cylinder.
4. Radius and slant height of a solid right circular cone are 35cm and 37cm respectively. Find the curved surface area and the total surface area of the cone. ($\pi = \frac{22}{7}$)
5. A hollow sphere in which a circus motor cyclist performs his stunts, has a inner diameter of 7m, Find the area available to the motorcyclist for riding. ($\pi = \frac{22}{7}$)
6. Total surface area of a solid hemisphere is 675π sq.cm. Find the curved surface are a of the solid hemisphere.

7. The thickness of a hemisperical bowl is 0.25cm the inner radius of the bowl is 15cm. Find the outer curved surface area of the bowl ($\pi = \frac{22}{7}$)

8. The external surface area of a hollow cylinder is 540π sq.cm, Its internal diameter is 16cm and height is 15cm, find the total surface area.

9. The radius and height of a right circular solid cone are 7cm and 24cm respectively. Find its curved surface area and total surface area.

10. If the curved surface area of a solid hemisphere is 2772 sq.cm then find its total surface area.

11. A hollow cylindrical iron pipe is of length 28cm, Its outer and inner diameters are 8cm 6cm respectively. Find the volume of the pipe and weight of the pipe if 1 cu. cm of iron weights 7gm ($\pi = \frac{22}{7}$)

12. Find the volume of a solid cylinder whose radius is 14cm and height 30cm.

13. The radii of two right circular cylinder are in the ratio 2 : 3. Find the ratio of their volume if their heights are in the ratio 5 : 3.

14. A rectangular sheet of metal foil with diamension 66cm x 12cm is rolled to form a cylinder of height 12cm. Find the volume of the cylinder.

15. Find the volume of a sphere - shaped matallic shot - put having diameter of 8.4cm. ($\pi = \frac{22}{7}$)

16. A cone, a hemisphere and cylinder have equal bases. If the heights of the cone and a cylinder are equal and are same as the common radius, then find the ratio of their respective volumes.

17. If the volumes of a solid sphere is $7241\frac{1}{7}$ cu.cm. then find its radius.

18. The volume of a solid hemisphere is 1152π cu. cm. Find its curved surface area.

19. Volume of a hollow sphere is $\frac{11352}{7}$ cm^3. If the outer radius is 8cm, find the inner radius of the sphere . ($\pi = \frac{22}{7}$)

20. Radius and slant height of a cone are 20cm and 29cm respectively. Find its volumes.

21. The circumference of the base of a 12m high wooden solid cone is 44m. Find the volume.

22. A vessel is in the form of a frustum of a cone. Its radius at one end the height are 8cm and 14cm respectively. If its volume is $\frac{5676}{3}$ cm^3 , the find the radius at the other end.

5 mark Questions :

1. If the total Surface area of a solid right circular cylinder is 880 sq.cm. and its radius is 10cm, find its curved surface area. ($\pi = \frac{22}{7}$)

2. The ratio between the base radius and the height of a solid right circular cylinder is 2 : 5. If its curved surface area is $\frac{3960}{7}$ sq.cm. Find the height and radius ($\pi = \frac{22}{7}$)

3. The diameter of a road roller of length 120cm is 84cm. If it takes 500 complete revolutions to level a play ground. Then find the cost of levelling it at the cost of 75 paise per square meter. ($\pi = \frac{22}{7}$)

4. The internal and external radii of a hollow cylinder are 12cm and 18cm respectively. If its height is 14cm, then find its curved surface area and total surface area. ($\pi = \frac{22}{7}$)

5. The radii of two circular ends of a frustum shaped bucket are 15cm and 8cm. If its depth is 63 cm, find the capacity of the bucket in liters. ($\pi = \frac{22}{7}$)

6. A solid wooden toy is in the form of a cone surmounted on a hemisphere. If the radii of the hemisphere and the base of the cone are 3.5cm each and the total height of the toy is 17.5cm, the find the volume of wood used in the toy. ($\pi = \frac{22}{7}$)

7. A circus tent is to be erected in the form of a cone surmounted on a cylinder. The total height of the tent is 49m. Diameter of the base is 42m and height of the cylinder is 21m. Find the cost of canvas needed to make the tent, if the cost of canvas is 12.50 / m^2. ($\pi = \frac{22}{7}$)

8. A hollow sphere of external and internal diameters of a 8cm and 4cm respectively is melted and made into another solid in the shape of a right circular cone of base diameter of 8cm. Find the height of the cone.

9. Using clay, a student made a right circular cone of height 48cm and base radius 12 cm. Another student reshapes it in the form of a sphere. Find the radius of the sphere.

10. An iron right circular cone of diameter 8cm and height 12 cm is melted and recast into spherical lead shots each of radius 4mm. How many lead shots can be made?

11. A cuboid shaped slab of iron whose diamensions are 55cm x 40cm x 15cm is melted and recast into a pipe. The outer diameter and thickness of the pipe are 8cm and 1cm respectively. Find the length of the pipe ($\pi = \frac{22}{7}$)

12. A right circular cylinder having diameter 12cm and height 15cm is full of ice cream. The ice cream is to be filled in cones of height 12cm and diameter 6cm, having a hemispherical shape on top. Find the member of such cones which can be filled with the ice cream available.

13. A cylindrical bucket of height 32cm and radius 18cm is filled with sand. The bucket is emptied on the ground and a conical heap of sand is formed. If the height of the conical heap is 24cm. Find the radius and slant height of the heap.

14. A cylindrical shape well of depth 20 m and diameter 14m is dug. The dug out soil is evenly spread to form a cuboid - platform with base dimension 20m x 14m. Find the height of the plat form.

Unit -9

Practical Geometry

TEN MARKS QUESTIONS

CONSTRUCTION OF TANGENTS TO A CIRCLE

1. Draw a circle of radius 3.2cm at a point P on it, draw a tangent to the circle using the tangent chord theorem.

2. Draw a circle of radius 3.2cm at a point P on it, draw a tangent to the circle using centre

3. Draw a circle of radius 4.2 cm, and take any point on the circle. draw the tangent at the point using the centre.

4. Draw a circle of radius 4.8cm, take a point on the circle. draw the tangent at the point using the chord theorem.

5. Draw a circle of radius 3cm from an external point 7cm away from its centre, construct the pair of tangents to the circle and measure their lengths.

6. Draw a circle of diameter 10cm. from a point P, 13 cm away from its centre, draw the two tangents PA and PB to the circle, and measure their lengths.

7. Draw the two tangents from a point which is 10cm away from the centre of a circle of radius 6cm also measure the lengths of the tangents.

8. Take a point which is 9cm away from a circle of radius 3cm, and draw the two tangents to the circle from that point.

CONSTRUCTION OF TRIANGLES

1. Construct a Δ ABC such that AB = 6cm, $\angle C = 40°$ and the altitude from C to AB is of length 4.2cm.

2. Construct a Δ PQR in which the base PQ = 6cm, $\angle R = 60°$ and the altitude from R to PQ is 4cm.

3. Construct a Δ ABC, in which BC = 5.5cm, $\angle A = 60°$ and the median AM from the vertex A is 4.5 cm.

4. Construct a Δ ABC, such that BC = 5cm, $\angle A = 45°$ and the median from A to BC is 4 cm.

5. Construct a Δ ABC, in which BC = 4.5cm, $\angle A = 40°$ and the median AM from A to BC is 4.7 cm. Find the length of the altitude from A to BC.

6. Construct a Δ ABC, in which the base BC = 5cm, $\angle BAC = 40°$ and the median from A to BC is 6 cm. also measure the length of the altitude from A.

7. Construct a Δ PQR, Such that PQ = 4cm, $\angle R = 60°$ and the altitude from R to PQ is 4.5 cm.

CONSTRUCTION OF A CYCLIC QUADRILATERAL

Construct a cyclic quadrilateral for the following measure ments.

1. AB = 6 cm, AC = 7 cm, BC = 6 cm and AD = 4.2 cm
2. PQ = 6.5 cm, QR = 5.5 cm, PR = 7 cm and PS = 4.5 cm
3. AB = 6 cm, AD = 4.8 cm, BD = 8 cm and CD = 5.5 cm
4. PQ = 4 cm, QR = 6 cm, PR = 7.5 cm and QS = 7 cm
5. EF = 7 cm, EH = 4.8 cm, FH = 6.5 cm and EG = 6.6 cm
6. KL = 5.5 cm, KM = 5 cm, LM = 4.2 cm and LN = 5.3 cm
7. AB = 6 cm, BC = 5.5 cm, $\angle ABC = 80°$ and AD = 4.5 cm
8. PQ = 5.5 cm, QR = 4.5 cm, $\angle QPR = 45°$ and PS = 3 cm
9. EF = 5.2 cm, $\angle GEF = 50°$, FG = 6 cm, and $\angle EGH = 45°$
10. AB = 6 cm, $\angle ABC = 75°$, BC = 5 cm, and $\angle ACD = 30°$
11. PQ = 5 cm, QR = 4 cm, $\angle QPR = 35°$ and $\angle PRS = 70°$
12. PQ = 4 cm, P = 100°, $\angle PQS = 40°$ and $\angle SQR = 70°$
13. AB = 5.5 cm, $\angle ABC = 50°$, $\angle BAC = 60°$ and $\angle ACD = 30°$
14. AB = 5.8 cm, $\angle ABD = 35°$, AD = 4.2 cm, and AB II CD
15. AB = 6.5 cm, $\angle ABC = 110°$, BC = 5.5 cm, and AB II CD

Unit - 10
Graphs

1. Solve the equation $x^2 - 2x - 3 = 0$ graphically

2. Solve graphically $2x^2 + x - 6 = 0$

3. Draw the graph of $y = 2x^2$ and hence solve $2x^2 + x - 6 = 0$

4. Draw the graph of $y = x^2$ and hence solve $x^2 - 4x - 5 = 0$

5. Draw the graph of $y = x^2 + 2x - 3$ and hence find the roots of $x^2 - x - 6 = 0$

6. Draw the graph of $y = x^2 - x - 8$ and hence find the roots of $x^2 - 2x - 15 = 0$

7. Draw the graph of $y = 2x^2 + x - 6$ and hence solve $2x^2 + x - 10 = 0$

8. Draw the graph of $y = x^2 + 3x + 2$ and use it to solve the equation $x^2 + 2x + 4 = 0$

9. Draw the graph of $y = x^2 + x - 12$ and hence solve $x^2 + 2x + 2 = 0$

Some special Graphs

1. Draw a graph for the following table and identify the variation

x	2	3	5	8	10
y	8	12	20	32	40

hence, find the value of y when x = 4

2. A bank gives 10% SI on deposits for senior citizens. Draw the graph for the relation between the sum deposited and the interest earned for one year. Hence find
   (i) The interest on the deposit of Rs.650
   (ii) The amount to be deposited to earn an interest of Rs.45

3. A bus travels at a speed of 40 km / hr. write the distance - time formula and draw the graph of it. hence, find the distance travelled in 3hrs.

4. The following table gives the cost and number of note books bought.

No. of. note books x	2	4	6	8	10	12
cost Rs. y	30	60	90	120	150	180

Draw the graph and hence
(i) Find the cost of seven note books.
(ii) How many note books can be bought for Rs. 165.

5.

x	1	3	5	7	8
y	2	6	10	14	16

Draw the graph for the above table and hence find
(i) the value of y if x = 4
(ii) the value of x if y = 12

6. The cost of the milk per litre is Rs.15. Draw the graph for the relation between the quantity and cost. Hence find
(i) the proportionality constant
(ii) the cost of 3 litres of milk

7.

No. of. note workers (x)	3	4	6	8	9	16
No. of days (y)	96	72	48	36	32	18

Draw graph for the data given in the table. Hence find the number of days taken by 12 workers to complete the work.

8. Draw the graph of xy = 20, x , y $>$ 0. use the graph to find y when x = 5, and to find x when y = 10.

9. A cyclist travels from a place. A to a place B along the same route at a uniform speed on different days. The following table gives the speed of his travel and the corresponding time he took to cover the distance

Speed in km / hr (x)	2	4	6	10	12
Time in hrs (y)	60	30	20	12	10

Draw the speed - time graph and use it to find.

(i) the number of hours he will take if he travels at a speed of 5km / hr.

(ii) the speed with which he should travel if he has to cover the distance in 40hrs.

UNIT : 11 STATISTICS

1. Range = L - S- (The difference between the greatest and the smallest of the observations)

2. Coefficient of range = $\frac{L - S}{L + S}$

3. Standard Deviation = Square root of the variance

4. Variance σ^2 = Square of standard deviation

5. standard deviation Ungrouped

   a) [direct method] $\sigma = \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2}$

   b) [actual mean method] $\sigma = \sqrt{\frac{\Sigma d^2}{n}}$ $\left[\begin{array}{l} d = x - \bar{x} \\ \bar{x} = \frac{\Sigma x}{n} \end{array}\right]$

   c) [Assumed mean method] $\sigma = \sqrt{\frac{\Sigma d^2}{n} - \left(\frac{\Sigma d}{n}\right)^2}$ $\left[\begin{array}{l} d = x - A \\ A = \text{assumed mean} \end{array}\right]$

   d) [step deviation method] $\sigma = \sqrt{\frac{\Sigma d^2}{n} - \left(\frac{\Sigma d}{n}\right)^2} \times c$ $\left[d = \frac{x - A}{c}\right]$

6. $\Sigma (x - \bar{x}) = 0$

   $\Sigma x = n \bar{x}$

   $\Sigma \bar{x} = n \bar{x}$

7. standard deviation Grouped

a) [actual mean method] $\sigma = \sqrt{\frac{\Sigma fd^2}{\Sigma f}}$ $\left[d = x - \bar{x}, \ \bar{x} = \frac{\Sigma x}{n} \right]$

b)[Assumed mean method] $\sigma = \sqrt{\frac{\Sigma fd^2}{\Sigma f} - \left(\frac{\Sigma fd}{\Sigma f}\right)^2}$ $\left[d = x - A, \ A = \text{assumed mean} \right]$

c) [step deviation method] $\sigma = \sqrt{\frac{\Sigma fd^2}{\Sigma f} - \left(\frac{\Sigma fd}{\Sigma f}\right)^2} \times c$ $\left[d = \frac{x - A}{c} \right]$

8. The standard deviation of a distribution remains unchanged when each value is added or subtracted by the same quantity.

9. If each value of a collection of data is multiplied or divided by a non - zero constant k, then the standard deviation of the new data is obtained by multiplying or dividing the standard deviation by the same quantity k.

10. Standard deviation of the first n natural numbers, $\sigma = \sqrt{\frac{n^2 - 1}{12}}$

11. Coefficient of variation

C.V. = $\frac{\sigma}{\bar{x}} \times 100$

where, σ = standard deviation

$\bar{x} = \frac{\Sigma x}{n}$

One Mark questions

1. The range of the first 10 prime numbers 2, 3, 5, 7, 11, 13, 17, 19, 23 and 29 is _____

2. The least value in a collection of data is 14.1. If the range of the collection is 28.4, then the greatest value of the collection is _____

3. The greatest value of a collection of data is 72 and the least value is 28. Then the coefficient of range is _____

4. For a collection of 11 items, $\Sigma x = 132$, then the arithmetic mean is _____

5. For any collection of n items, $\Sigma (x - \bar{x}) =$ _____

6. For any collection of n items, $(\Sigma x) - \bar{x}) =$ _____

7. If it is the standard deviation of x, y, z then the standard deviation of x+5, y+5, z+5 is _____

8. If the standard deviation of a set of data is 1.6,then the variance is _____

9. If the variance of a data is 12.25, then the S.D. is _____

10. Variance of the first 11 natural numbers is _____

11. The variance of 10, 10, 10, 10, 10 is _____

12. If the Variance of 14, 18, 22, 26, 30 is 32 then the variance of 28, 36, 44, 52, 60 is _____

13. S.D. of a collection of data is $2\sqrt{2}$, If each value is multiplied by 3, then the standard deviation of the new data is _____

14. Given $\Sigma (x - \bar{x})^2 = 48$, $\bar{x} = 20$ and n = 12, The coefficient of variation is _____

15. Mean and standard deviation of a data are 48 and 12 respectively. The coefficient of the variation is _____

Two Mark questions :

1. Find the range and the coefficient of the following
   i) 43, 24, 38, 56, 22, 39, 45
   ii) 42.5, 47.5, 48.6, 50.5, 49, 46.2, 49.8, 45.8, 46.9
   iii) 59, 46, 30, 23, 27, 40, 52, 35, 29
   iv) 41.2, 33.7, 29.1, 34.5, 25.7, 24.8, 56.5, 12.5

2. The largest value of a collection of data is 7.44. If the range is 2.26, then find the smallest value in the collection

3. The smallest value of a collection of data is 12 and the range is 59. Find the largest value of the collection of data.

4. The largest of 50 measurement is 3.84 kg. If the range is 0.46 kg, Find the smallest measurement.

5. Find the standard deviation of the first 10 natural numbers,

6. Calculate the standard deviation of the first 13 natural numbers.

7. If the coefficient of variation of a collection of data is 57 and its S.D. is 6.84, then find the mean.

8. If n = 10, $\bar{x} = 12$ and $\Sigma x^2 = 1530$, then calculate the coefficient of variation.

9. The standard deviation of 20 observations is $\sqrt{5}$. It each observation is multiplied by 2, find the standard deviation and variance of the resulting observations.

Five Mark Questions

1. Prove that the standard deviation of the first n natural numbers is $\sigma = \sqrt{\frac{n^2 - 1}{12}}$

2. The Number of books read by 8 students during a month are 2, 5, 8, 11, 14, 6, 12, 10 calculate the standard deviation of the data.

3. The Marks obtained by 10 students in a test in mathematics are: 80, 70, 40, 50, 90, 60, 100, 60, 30, 80. Find the Standard deviation.

4. Find the standard deviation of the numbers 62, 58, 53, 50, 63, 52, 55

5. Calculate the standard deviation of the following data

x	3	8	13	18	23
y	7	10	15	10	8

6. Calculate the coefficient of S.D. of the following data
   i) 10, 20, 15, 8, 3, 4
   ii) 38, 40, 34, 31, 28, 26, 34

7. Calculate the coefficient of variation of the following data : 20, 18, 32, 24, 26

8. Calculate the coefficient of variation of the following data : 18, 20, 15, 12, 25

9. Given $\Sigma x = 99$, $n = 9$ and $\Sigma (x - 10)^2 = 79$ FInd Σx^2 and $\Sigma (x - \bar{x})^2$

10. If $\Sigma x = 35$, $n = 5$, $\Sigma (x - 9)^2 = 82$. then FInd Σx^2 and $\Sigma (x - \bar{x})^2$

UNIT : 12 PROBABILITY

1. The Probability of the event A, $P(A) = \frac{n(A)}{n(S)}$

2. The Probability of the sure event is I . $P(S) = 1$

3. The Probability of the impossible event is 0 . $P(\emptyset) = 0$

4. The Probability of an event A lies between 0 and 1 in $0 \leq P(A) < 1$

5. The Probability of that the event A will not occur is given by $P(\overline{A})$ (or) $P(A^1)$

6. $P(A^1) = 1 - P(A)$

7. $P(A) + P(A^1) = 1$

8. Addition theorem on probability
   (i) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
   (ii) If A and B are mutually exclusive events then $A \cap B = \emptyset$
   $P(A \cup B) = P(A) + P(B)$
   $P(A \cap B) = 0$

9. $P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(A \cap C) + P(A \cap B \cap C)$

10. If A_1, A_2 and A_3 are three mutually exclusive events, then
    $P(A_1 \cup A_2 \cup A_3) = P(A_1) + P(A_2) + P(A_3)$

11. $P(A \cap \overline{B}) = P(A) - P(A \cap B)$
    $P(\overline{A} \cap B) = P(B) - P(A \cap B)$

One Mark Questions

1. If (Ø) is an impossible event, then P (Ø) = _____

2. If S is the sample space of a random experiment, then P(S) = _____

3. It P is the probability of an event A, then P satisfies _____

4. Let A and B be any two events and S be the corresponding sample space then $P(\overline{A} \cap B)$ = _____

5. The probability that a student will score centum in mathematics is 4/5. The Probability that he will not score centum is _____

6. If A and B are two events, Such that P (A) = 0.25, P (B) = 0.05 $P(A \cap B) = 0.14$, then P (A U B) = _____

7. There are 6 defective items in a sample of 20 items. One item is drawn at random. The probability that it is a non - defective item is _____

8. If A and B are mutually exclusive events and S is the sample space such that P (A) = 1/3. P (B) and S = A U B then P (A) = _____

9. The probabilities of three mutually exclusive events A, B and C are given by 1/3, 1/4 an 5/12 then P (AUBUC) = _____

10. If P(A) = 0.25, P(B) = 0.50, $P(A \cap B) = 0.14$ then P(neither A nor B) = _____

11. A bag contains 5 black balls, 4 white balls and 3 red balls. If a ball is selected at random, the probability that it is not red is _____

12. Two dice are thrown simultaneously. The probability of getting a doublet is ____

13. A fair die is thrown once. The probability of getting a prime or composite number is _____

14. Probability of getting 3 heads or 3 tails in tossing a coin 3 times is _____

15. A card is drawn from a pack of 52 card at random. The probability of getting neither an ace nor a king card is _____

16. The probability that a leap year will have 53 fridays or 53 saturdays is _____

17. The probability that a non - leap year will have 53 sundays and 53 mondays is _____

18. The probability of selecting a queen of heart when a card is drawn from a pack of 52 playing cards is _____

19. Probability of sure event is _____

20. The out come of a random experiment results in either success or failure. If the probability of success is twice the probability of failure, then the probability of success is _____

Two Mark Questions

1. A fair die is rolled. find the probability of getting (i) the number 4 (ii) A prime factor of 6

2. An integer is choosen from first 20 natural numbers. what is the probability that it is a prime number?

3. There are 7 defective items in a sample of 35 items. Find the probability that an item choosen at random is non - defective

4. If A is an event of a random experiment such P(A) : P($\overline{A}$) = 7 : 12, then find P(A) = ?

5. A die is thrown twice. Find the probability of getting a total of 9.

6. Three rotten are mixed with 12 good ones. One egg is choosen at random. what is the probability of choosing a rotten egg?

7. Two coins are tossed together, what is the probability of getting at most one head.

8. One card is drawn randomly from a well shuffled deck of 52 playing cards. Find the probability that the draw card is a diamond.

9. Three dice are thrown simultaneously. Find the probability of getting a same number. On all the three dice.

10. If A and B are mutually exclusive events, such that P(A) = 3/5 and P(B) = 1/5 then find P(AUB)

Five Marks Questions

1. A fair die is rolled. Find the probability of getting:
   (i) the number 4 (ii) an over number
   (iii) a prime factor (iv) a number greater then 4

2. In tossing a fair coin twice, find the probability of getting
   (i) two heads (ii) at least one head
   (iii) exactly one tail

3. Two unbiased dice are rolled once. Find the probability of getting
   (i) a sum 8 (ii) a doublet (iii) a sum greater than 8

4. From a well shuffled pack of 52 playing cards, one card is drawn at random. Find the probability of getting
   (i) a king (ii) a black king (iii) a spade card (iv) a diamond 10

5. Three coins are tossed simultaneously. Find the probability of getting
   (i) at least one head (ii) exactly two tails (iii) at least two heads

6. A box contains 4 Green, 5 Blue and 3 Red balls, A ball is drawn at random. Find the probability that the selected ball is
(i) red in colour (ii) not green in colour

7. Three coins are tossed, simultaneously, Using addition theorem on probability. Find the probability that either exactly two tails or at least one head turn up.

8. A bag contains 10 white, 5 black, 3 green and 2 red balls. One ball is drawn at random. Find the probability that the ball drawn is white or black or green.

9. A die is thrown twice. Find the probability that at least one of the two throws comes up with the number 5 (use addition theorem)

10. A card is drawn from a deck of 52 cards. find the probability of getting a king (or) a Heat (or) a red card.

11. If a die is rolled twice, find the probability of getting an even number in the first time (or) a total of 8.

12. A card is drawn at random from a well - shuffled deck of 52 cards. Find the probability that it will be a spade or a king.

13. A box contains 10 white, 6 red and 10 black balls. A ball is drawn at random. Find the probability that the ball drawn is white or red.

14. The probability that a new car will get an award for its design is 0.25, the probability that it will get an award for efficient use of fuel is 0.35 and the probability that it will get both the awards is 0.15. Find the probability that.
(i) it will get atleast one of the two awards
(ii) it will get only one of the awards

15. The probability that a girl will be selected for admission in a medical college is 0.16. The probability that she will be selected for admission in an engineering college is 0.24 and the probability that she will be selected in both, is 0.11.
(i) Find the probability that she will be selected in at least one of the two colleges.
(ii) Find the probability that she will be selected either in a medical college only or in an engineering college only.

16. Find the probability that,
    (i) a leap year selected at random will have 53 fridays.
    (ii) a leap year selected at random will have only 52 fridays.
    (iii) a non - leaf year selected at random will have 53 fridays.

17. The probability that A, B and C can solve a problem are $\frac{4}{5}$, $\frac{2}{3}$ and $\frac{3}{7}$ respectively. The probability of the problem being solved by A and B is $\frac{8}{15}$, B and C is $\frac{2}{7}$, A and C is $\frac{12}{35}$. The probability of the problem being solved by all the three is $\frac{8}{35}$. Find the probability that the problem can be solved by atleast one of them.

For the show learners

To get minimum 50 Marks, they should practice the following problems:

S.I. No.	Unit	2 Marks		5 Marks	
1.	1. Sets and Functions	Example 1.1 . 1.21		Example 1.6 1.7 1.8 1.9 1.10 1.20 1.22	
		Ex. 1.1 1.2 1.3 1.4	1, 2, 3, 4, 5, 6 4, 5 1, 2 3, 4, 5, 6, 8, 9		
				Ex. 1.2 1.4	6, 7, 8, 9 4, 10, 13, 14,15, 16
2.	3. Algebra			Example 3.17 3.18 3.33 3.34 3.35	
				Ex. 3.5 3.13	1 1, 2
3.	4. Matrices	Example 4.3 4.4 4.5		Example 4.14 4.16 4.19	
		Ex. 4.1 4.2 4.3	2, 4, 6, 7, 9, 10 3, 4, 5, 6 2	Ex. 4.2 4.3	7, 10 6, 8, 9, 11,13
4.	5. Coordinate Geometry	Example 5.1 5.2 5.5		Example 5.11 5.12 5.17 5.18 5.23 5.29	
		Ex. 5.1	1, 2, 3, 4, 6, 7, 8		
				Ex. 5.2 5.3 5.5	5, 6 13, 14, 15, 16 10, 14, 15

S.I. No.	Unit	2 Marks		5 Marks	
5.	7. Trigonometry	Example 7.1 7.2 7.6 7.7 7.14 7.15 7.16 7.17			
		Ex. 7.1 7.2	2 - i, ii, iii 1, 2, 3, 5		
6.	11. Geometry	Example 11.1 11.2 11.3 11.11 11.22		Example 11.4 11.6 11.17	
		Ex. 11.1	1, 2, 3, 4, 5, 17, 18	Ex. 11.1	16, 16 - i
7.	12. Probability	Example 12.3 12.4 12.8 12.11			
		Ex. 12.1 12.2	1, 2, 4, 14 1, 2, 3		

10 Marks

8.	9. Practical Geometry	1. Tangents Example : 9.1, 9.2, 9.3 Ex. 9.1 : 1, 2, 3, 4, 5	2. Triangle Example : 9.4, 9.5, 9.6 Ex. 9.2 : 2, 3, 4, 5
		3. Cyclic quadrilateral Example : 9.9, 9.10, 9.11 Ex. 9.3 : All Problems	
9.	10. Graphs	Special Graphs only Example : 10.7, 10.8, 10.9 Ex. 10.2 : All Problems	

Model Question - 2013 - 2014

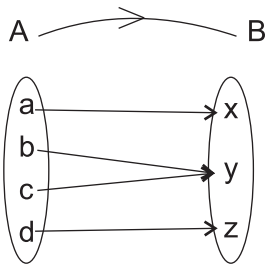
Mathematics

X - Std

Time : 2 1/2 hrs Marks : 100

Choose the correct answer in each question :

15 x 1 = 15

1. 

is a _____ function

a) one - one b) onto c) one - one and onto d) constant

2. if a_1, a_2, a_3 ..... are in A.P. such that $\frac{a_4}{a_1} = \frac{3}{2}$ then the 13th term of the A.P is

a) 12a b)14a c) 0 d) 3/2

3. The sequence -3, -3, -3, ...is

a) an A.P. only b) a G.P only c) neither A.P nor G.P

d) both A.P and G.P

4. The sum of two zeros of the polynomial $f(x) = 2x^2 + (P+3)x + 5$ is zero, then the value of P is

a) 3 b)-3 c) 4 d) -4

5. If $ax^2 + bx + c = 0$ has equal roots, then C is equal

a) $\frac{b^2}{2a}$ b) $\frac{b^2}{4a}$ c) $-\frac{b^2}{2a}$ d) $-\frac{b^2}{4a}$

6. If $(5 \ x \ 1)\begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix} = 20$, then the value of x is

a) 7 b) -7 c) 1/7 d)0

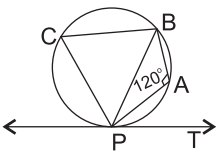
7. The slope of the straight line $7y - 2x = 11$ is equal to

a) $-\frac{7}{2}$ b) $\frac{7}{2}$ c) $\frac{2}{7}$ d) $-\frac{2}{7}$

8. The equation of the straight line passing through the origin and perpendicular to the straight line $2x + 3y - 7 = 0$ is

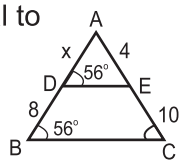
a) $2x + 3y = 0$ b)$3x - 2y = 0$ c)$y+5 = 0$ d)$y-5 = 0$

9. In figure, if $\lfloor PAB = 120°$ then $\lfloor BPT =$



a) 120° b)30° c)40° d) 60°

10. In the figure, the value x is equal to



a) 4.2 b) 3.2
c) 0.8 d) 0.4

11. $9\tan^2\theta - 9\sec^2\theta =$

a) 1 b)0 c) 9 d) -9

12. $\sin^2\frac{\pi}{3} + \sin^2\frac{\pi}{6} =$

a) 4 b) -4 c) 2 d) 0

13. if total surface area of a solid right circular cylinder where radius is half of its height h is equal to

a) $\frac{3}{2}\pi h$ sq.units b) $\frac{2}{3}\pi h^2$ sq.units c) $\frac{3}{2}\pi h^2$ sq.units

d) $\frac{2}{3}\pi h$ sq.units

14. For any collection of n items $\Sigma(x) - \bar{x} =$ _____

a) $n\bar{x}$ b) $(n-2)\bar{x}$ c) $(n-1)\bar{x}$ d)0

15. Probability of getting 3 heads or 3tails in tossing a coin 3 times is

a) $\frac{1}{8}$ b) $\frac{1}{4}$ c) $\frac{3}{8}$ d) $\frac{1}{2}$

PART II

Answer any 10 questions : 10 x 2 = 20

16. Let A = {10, 15, 20, 25, 30}
B = {1, 5, 10, 15, 20}
and C = {7, 8, 15, 20, 35} find $A \mid (B \cap C)$

17. A function f (-7, 6) →R is defined as follows

$$f(x) = \begin{cases} x2 + 2x + 1 ; & -7 \le x < 5 \\ x + 5 ; & -5 \le x \le 2 \end{cases}$$

find 2f(-4) + 3f(2)

18. The sum of a number and its reciprocal is $\frac{65}{8}$, Find the number

19. If $A = \begin{pmatrix} 5 & 3 \\ 7 & 5 \end{pmatrix}$, $x = \begin{pmatrix} x \\ y \end{pmatrix}$ and $C = \begin{pmatrix} -5 \\ -11 \end{pmatrix}$ and if AX = C, then find the values of x and y

20. Find the value of K for which the given points are collinear (2, -5), (3, -4) and (9, K)

21. Find the x and y intercepts of the straight line 2x - y + 16 = 0

22. AB and CD are two chords of a circle which interest each other externally at P. If BP = 3cm, CP = 6cm, and CD = 2cm then find AB

23. Prove the identity

$$\sqrt{\frac{1 - \sin\theta}{1 + \sin\theta}} = \sec\theta - \tan\theta$$

24. Find the angular elevation (angle of elevation from the ground level) of the sun when the length of the shadow of a 30m long pole i $10\sqrt{3}$ m

25. Total surface area of a solid hemisphere is 675 π sq.cm. Find the curved surface area of the solid hemisphere.

26. If the volume of a solid sphere is $7241\frac{1}{7}$ cu. cm, then find its radius

27. Find the standard deviation of the first 10 natural numbers.

28. A letter is chosen at random from the letters of the word "ENTERTAINMENT". Find the probability that the chosen letter is a vowel or T (repetition of letters is allowed)

29. In Δ ABC, the internal bisector AD of $\angle A$ meets the side BC at D. If BD = 2.5 cm, AB = 5cm and AC = 4.2cm, then find DC.

30. If the curved surface area of a right circular cylinder is 704 sq.cm and height is 8cm, find the volume of the cylinder in litres (Take $\pi = \frac{22}{7}$)

or

Find the total area of 14 sguares whose sides are 11cm, 12cm, ... 24cm

PART - III

5 Mark Questions

31. Use venn diagram to verify De Morgan's law for set difference.
A I (B ∩ C) = (A I B) U (A I C)

32. Let A = {6, 9, 15, 18, 21) B = {1, 2, 4, 5, 6} and f : A → B be defoned by $f(x) = \frac{x - 3}{3}$. Represent f by
i) an arrow diagram ii) a set of ordered pairs
iii) a table iv) a graph

33. Find the total volume of 15 cubes whose edges are 16cm, 17cm, 18cm, ... ,30cm respectively

34. Factorize $x^3 - 3x^2 - 10x + 24$.

35. The GCD of $x^4 + 3x^3 + 5x^2 + 24x + 56$ and
$x^4 + 2x^3 - 4x^2 - x + 28$, is $x^2 + 5x + 7$. Find their LCM

36. If $A = \begin{pmatrix} 1 & -4 \\ -2 & 3 \end{pmatrix}$, and $B = \begin{pmatrix} -1 & 6 \\ 3 & -2 \end{pmatrix}$ then Prove that $(A+B)^2 \neq A^2 + 2AB + B^2$

37. If the vertices of a Δ ABC are A(2, -4), B(3, 3) and C(-1, 5). Find the equation of the straight line along the altitude from the vertex B.

38. State and Prove Angle Bisector theorem.

39. If $\tan\theta + \sin\theta = m$, $\tan\theta - \sin\theta = n$, and $m \neq n$, then show that $m^2 - n^2 = 4\sqrt{mn}$

40. A vertical tree is broken by the wind. The top of the tree touches the ground and makes an angle 30° with it. If the top of the tree touches the ground 30m away from its foot, then find the actual height of the tree.

41. The redii of two circular ends of a frustem shapped bucket are 15cm and 8cm. If its depth is 63m, find the capacity of the bucket in litres ($\pi = \frac{22}{7}$)

42 An iron right circular cone of diameter 8cm and height 12cm is melted and recast into spherical lead shots each of radius 4mm. How many lead shots can be made?

43. Calculate the standard deviation of the following data : 38, 40, 34, 31, 28, 26, 34.

A box contains 10 white, 6 red and 10 black balls. A ball is drawn at random. Find the probability that the ball drawn is white or red.

Find the values of a and b if the following

(a) polynomial is a perfect square.

$x^4 - 4x^3 + 10x^2 - ax + b$.

(or)

(b) Find the sum of all natural numbers between 300 and 500 which are divisible by 11.

PART - IV

Answer both the question choosen either of the alternatives. 2 x 10 = 20

46. Draw the two tangents from a point which is 10cm away from the centre of a circle of radius 6cm also measure the lengths of the tangents

(or)

Construct a Δ ABC in which B = 5.5cm $\angle A = 60°$ and the median AM from the vertex A is 4.5 cm

47. Draw the graph of $y = x^2 - x - 8$ and hence find the roots of $x^2 - 2x - 15 = 0$

(or)

No. of. note workers (x)	3	4	6	8	9	16
No. of days (y)	96	72	48	36	32	18

Draw graph for the data given in the table. Hence find the number of day taken by 12 workers to complete the work