UNIT - 2 : NUMBERS AND SEQUENCES

1	Euclid's Division Algorithm	$a = bq + r$
2	The terms of an AP (General form)	$a, a+d, a+2d,$ $a+3d, \ldots\ldots..$
3	To find n^{th} term of an Arithmetic Progression (AP)	$t_n = a + (n-1)\,d$
4	To find the Number of terms	$n = \dfrac{l-a}{d} + 1$
5	Common difference	$d = t_2 - t_1$
6	Sum of n terms of a A.P.	$S_n = \dfrac{n}{2}\left[2a + (n-1)d\right]$ $S_n = \dfrac{n}{2}(a+l)$
7	3 Consecutive terms of an AP	$a-d, a, a+d$
8	The terms of a GP (General form)	$a, ar, ar^2, ar^3, \ldots$
9	To find n^{th} terms of a Geometric Progression (G.P.)	$t_n = a\,r^{n-1}$
10	Common ratio :	$r = \dfrac{t_2}{t_1}$
11	Sum of n terms of a G.P.	$S_n = \dfrac{a(r^n - 1)}{r-1}$
12	3 Consecutive terms of a GP	$a/r, a, ar$
13	Sum of infinite terms of a G.P.	$S_\infty = \dfrac{a}{1-r}$
14	Sum of first n natural numbers	$S_n = \dfrac{n(n+1)}{2}$
15	Sum of squares of first n natural numbers	$S_n = \dfrac{n(n+1)(2n+1)}{6}$
16	Sum of cubes of first n natural numbers	$S_n = \left[\dfrac{n(n+1)}{2}\right]^2$
17	Sum of first n odd numbers.	$S_n = n^2$

UNIT - 3 : ALGEBRA

1	Relationship between LCM and HCF	**f(x) x g(x) =** LCM **x** HCF
2	General form of Quadratic Equation	**x^2-(Sum of the roots)x + (Product of the roots) = 0** **x^2-(α + β)x +αβ=0**
3	To find the roots of Quadratic Equations	$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
4	**Nature of roots**	$\Delta = b^2 - 4ac$
	If, Δ > 0	**The roots are real and unequal**
	If, Δ = 0	**The roots are real and equal**
	If, Δ < 0	**No real root**
5	The relation between Roots and coefficients of a Quadratic Equation	**α + β = $\dfrac{-b}{a}$** **α β = $\dfrac{c}{a}$**
6	**$α^2 + β^2$**	**$(α + β)^2 - 2 α β$**
7	**$(α - β)^2$**	**$(α + β)^2 - 4 α β$**
8	**$α^3 + β^3$**	**$(α + β)^3 - 3 α β(α + β)$**
9	**$α^3 - β^3$**	**$(α - β)^3 + 3 α β(α - β)$**
10	**$α^4 + β^4$**	**$(α^2 + β^2)^2 - 2 (α β)^2$**

UNIT 4 - GEOMETRY

1	Basic Proportionality Theorem (BPT) (or) Thales Theorem	$\dfrac{AD}{DB} = \dfrac{AE}{EC}$
2	Angle Bisector Theorem	$\dfrac{AB}{AC} = \dfrac{BD}{CD}$
3	Pythagoras Theorem	$AB^2 + AC^2 = BC^2$
4	Ceva's Theroem	$\dfrac{BD}{DC} \; X \; \dfrac{CE}{EA} \; X \dfrac{AF}{FB} = 1$

UNIT 5 - CO-ORDINATE GEOMETRY

1	Distance between two points	$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$
2	Midpoint	$\left(\dfrac{x_1+x_2}{2},\dfrac{y_1+y_2}{2}\right)$
3	Centroid of a triangle	$\left(\dfrac{x_1+x_2+x_3}{3},\dfrac{y_1+y_2+y_3}{3}\right)$
4	Section Formula (Internal Division)	$\left(\dfrac{mx_2+nx_1}{m+n},\dfrac{my_2+ny_1}{m+n}\right)$
5	Section Formula (External Division)	$\left(\dfrac{mx_2-nx_1}{m-n},\dfrac{my_2-ny_1}{m-n}\right)$
6	Area of Triangle	$\dfrac{1}{2}\{(x_1y_2+x_2y_3+x_3y_1)-(x_2y_1+x_3y_2+x_1y_3)\}$
7	Area of Quadrilateral	$\dfrac{1}{2}\{(x_1y_2+x_2y_3+x_3y_4+x_4y_1)+(x_2y_1+x_3y_2+x_4y_3+x_1y_4)\}$
	Formulas for find Slope	
8	If two points given	$m=\dfrac{y_2-y_1}{x_2-x_1}$
9	If angle is given	$m = \tan\theta$
10	If equation of a straight line is given	$m = \dfrac{\text{- coefficient of } x}{\text{coefficient of } y}$
11	If two lines are Parallel	$m_1 = m_2$ (or) $\dfrac{a_1}{a_2}=\dfrac{b_1}{b_2}$
12	If two lines are Perpendicular	$m_1 \times m_2 = -1$ (or) $a_1a_2 = b_1b_2=0$
13	Equation of a straight line parallel to X axis	$y = b$
14	Equation of a straight line parallel to Y axis	$x = a$
15	Equation of a straight line which is parallel to the straight line **ax + by + c =0**	**ax + by + k =0**
16	Equation of a straight line which is perpendicular to the straight line **ax+by+c=0**	**bx - ay + k =0**

	EQUATIONS OF A STRAIGHT LINE	
17	Slope - Intercept form	**y=mx + c**
18	Point - Slope form	**y - y$_1$ = m (x - x$_1$)**
19	Two point form	$\dfrac{y - y_1}{y_2 - y_1} = \dfrac{x - x_1}{x_2 - x_1}$
20	Intercept form	$\dfrac{x}{a} + \dfrac{y}{b} = 1$

UNIT 6 - TRIGONOMETRY

$\sin\theta = \dfrac{\text{Opposite side}}{\text{Hypotenuse}}$	$\csc\theta = \dfrac{\text{Hypotenuse}}{\text{Opposite side}}$	$\sin(90 - \theta) = \cos\theta$	$\cos(90 - \theta) = \sin\theta$
$\cos\theta = \dfrac{\text{Adjacent side}}{\text{Hypotenuse}}$	$\sec\theta = \dfrac{\text{Hypotenuse}}{\text{Adjacent side}}$	$\csc(90 - \theta) = \sec\theta$	$\sec(90 - \theta) = \csc\theta$
$\tan\theta = \dfrac{\text{Opposite side}}{\text{Adjacent side}}$	$\cot\theta = \dfrac{\text{Adjacent side}}{\text{Opposite side}}$	$\tan(90 - \theta) = \cot\theta$	$\cot(90 - \theta) = \tan\theta$

$\sin^2\theta + \cos^2\theta = 1$
$1 + \tan^2\theta = \sec^2\theta$
$1 + \cot^2\theta = \csc^2\theta$

TRIGONOMETRIC TABLE:

θ	0°	30°	45°	60°	90°
$\sin\theta$	0	$\dfrac{1}{2}$	$\dfrac{1}{\sqrt{2}}$	$\dfrac{\sqrt{3}}{2}$	1
$\cos\theta$	1	$\dfrac{\sqrt{3}}{2}$	$\dfrac{1}{\sqrt{2}}$	$\dfrac{1}{2}$	0
$\tan\theta$	0	$\dfrac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Undefined
$\csc\theta$	Undefined	2	$\sqrt{2}$	$\dfrac{2}{\sqrt{3}}$	1
$\sec\theta$	1	$\dfrac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Undefined
$\cot\theta$	Undefined	$\sqrt{3}$	1	$\dfrac{1}{\sqrt{3}}$	0

UNIT 7 - MENSURATION

	CYLINDER	
	CYLINDER	
1	CSA of a Cylinder	$2\pi rh$
2	TSA of a Cylinder	$2\pi r(h+r)$
3	Volume of a Cylinder	$\pi r^2 h$
	HOLLOW CYLINDER	
4	CSA of a Hollow Cylinder	$2\pi(R+r)h$
5	TSA of a Hollow Cylinder	$2\pi(R+r)(h+R-r)$
6	Volume of a Hollow Cylinder	$\pi(R^2 - r^2)h$
	CONE	
7	CSA of a cone	πrl $(l^2=r^2+h^2)$
8	TSA of a Cone	$\pi r(l+r)$
9	Volume of a Cone	$\frac{1}{3}\pi r^2 h$
	FRUSTUM	
10	CSA of a Frustum	$\pi(R+r)l$ $(l^2=(R-r)^2+h^2)$
11	TSA of a Frustum	$\pi(R+r)l + \pi R^2 + \pi r^2$
12	Volume of a Frustum	$\frac{1}{3}\pi h (R^2 + r^2 + Rr)$
	SPHERE	
13	CSA of a Sphere	$4\pi r^2$
14	TSA of a Sphere	$4\pi r^2$
15	Volume of a Sphere	$\frac{-}{3}\pi r^3$

	HOLLOW SPHERE	
16	CSA of a Hollow sphere	$4\pi R^2$
17	TSA of a Hollow sphere	$4\pi(R^2 + r^2)$
18	Volume of a Hollow sphere	$\frac{-}{3}\pi(R^3 - r^3)$
	HEMISPHERE	
19	CSA of a Hemisphere	$2\pi r^2$
20	TSA of a Hemisphere	$3\pi r^2$
21	Volume of a Hemisphere	$\frac{2}{3}\pi r^3$
	HOLLOW HEMISPHERE	
22	CSA of a Hollow Hemisphere	$2\pi(R^2 + r^2)$
23	TSA of a Hollow Hemisphere	$\pi(3R^2 + r^2)$
24	Volume of a Hollow Hemisphere	$\frac{2}{3}\pi(R^3 - r^3)$
	CUBE	
25	LSA of a Cube	$4a^2$
26	TSA of a Cube	$6a^2$
27	Volume of a Cube	a^3
	CUBOID	
28	LSA of a Cube	$2h(l+b)$
29	TSA of a Cube	$2(lb+bh+lh)$
30	Volume of a Cube	lbh

UNIT - 8 : STATISTICS AND PROBABILITY

1	Mean	$\dfrac{\Sigma x}{n}$	
2	Range	$L - S$	
3	Coefficient of Range	$\dfrac{L - S}{L + S}$	
	Standard Deviation (Ungrouped Data)		
4	Direct Method	$\sigma = \sqrt{\dfrac{\Sigma x^2}{n} - \left(\dfrac{\Sigma x}{n}\right)^2}$	
5	Mean Method	$\sigma = \sqrt{\dfrac{\Sigma d^2}{n}}$	$d = x - \bar{x}$
6	Assumed Mean Method	$\sigma = \sqrt{\dfrac{\Sigma d^2}{n} - \left(\dfrac{\Sigma d}{n}\right)^2}$	$d = x - A$
7	Step Deviation Method	$\sigma = c \times \sqrt{\dfrac{\Sigma d^2}{n} - \left(\dfrac{\Sigma d}{n}\right)^2}$	$d = \dfrac{x - A}{c}$
	Standard Deviation (Grouped Data)		
8	Direct Method	$\sigma = \sqrt{\dfrac{\Sigma f d^2}{\Sigma f}}$	
9	Assumed Mean Method	$\sigma = \sqrt{\dfrac{\Sigma f d^2}{\Sigma f} - \left(\dfrac{\Sigma f d}{\Sigma f}\right)^2}$	$d = x - A$
10	Step Deviation Method	$\sigma = c \times \sqrt{\dfrac{\Sigma f d^2}{\Sigma f} - \left(\dfrac{\Sigma f d}{\Sigma f}\right)^2}$	$d = \dfrac{x - A}{c}$
11	Standard Deviation of first n natural numbers	$\sigma = \sqrt{\dfrac{n^2 - 1}{12}}$	
12	Coefficient of Variation	$C.V. = \dfrac{\sigma}{x} \times 100\%$	

13	$P(A) = \dfrac{n(A)}{n(S)}$
14	$P(\overline{A}) = 1 - P(A)$
15	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
16	$P(A \cap \overline{B}) = P(A) - P(A \cap B)$
17	$P(\overline{A} \cap B) = P(B) - P(A \cap B)$
18	$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(C \cap A) + P(A \cap B \cap C)$