

** P A P E R - A **

Chapter # 02

1: Define a sequence.

(IIA-2017), (IA-2018), (IIA-2019), (IIA-2020)

Ans. A set of numbers arranged in order by some fixed rule is called a sequence.
Examples: (i) 2, 4, 6, ... (ii) 3, 9, 27, ...

2: Define finite sequence.

(IIA-2018)

Ans. A sequence is called finite sequence, if it has finite terms.
Example: 2, 4, 6, 8, ... , 50

3: Define infinite sequence.

(IA-2019)

Ans. A sequence is called infinite sequence, if it has infinite terms.
Example: 4, 6, 8, 10, ...

4: Define common difference.

(IIA-2015), (IA-2016)

Ans. The difference between any two consecutive terms of an A.P. is called common difference.

5: Define a series.

(IIA-2016)

Ans. The sum of the terms of a sequence is called a series.

6: Define Arithmetic means (A.Ms).

Ans. If a, A, b are three consecutive terms in an A.P., then A is called A.M. of a & b

$$\text{and } A = \frac{a + b}{2}$$

7: Define a common ratio.

Ans. The Ratio between any two consecutive terms of G.P., is called common ratio.

$$r = \frac{a_n}{a_{n-1}}, n > 1.$$

8: Define geometric means.

(IIA-2017)

Ans. If a, G, b are three consecutive terms in a G.P., then G is called G.M. of a and b
 and $G = \pm\sqrt{ab}$

Chapter # 03

9: State Binomial Theorem for positive integer 'n'.

(IA-2019)

Ans. The rule for expansion of $(a + b)^n$, where 'n' is any positive integral power, is called binomial theorem, and defined as:

$$(a + b)^n = \binom{n}{0} a^n b^0 + \binom{n}{1} a^{n-1} b^1 + \binom{n}{2} a^{n-2} b^2 + \dots + \binom{n}{n} a^0 b^n$$

Chapter # 04

10: What is partial fractions?

Ans. The process, which convert a single rational fraction, into the sum of two or more single rational fractions is called partial fractions.

11: Define proper fraction and give one example.

(IA-2015), (IA-2017), (IIA-2017), (IA-2019), (IIA-2019)

Ans. A fraction in which the degree of the numerator is less than the degree of the denominator is called proper fraction.

Example: $\frac{2x}{(x-2)(x+5)}$

12: Define improper fraction and give one example.

(IIA-2015), (IIA-2016)

Ans. A fraction in which the degree of the numerator is greater then or equal to the degree of denominator is called improper fraction. **Example:** $\frac{x^2 + 1}{(x+1)(x-1)}$

Chapter # 05

13: Define degree and radian measures.

(IA-2018)

Ans. Degree: If a circle is divided into 360^o equal parts, then angle subtended by one part at the center of the circle is called a degree.

Radian: Radian is the measure of the angle subtended at the center of the circle by an arc, whose length is equal to the radius of the circle.

Chapter # 07

14: Define the law of sines.

(IIA-2015), (IA-2016), (IIA-2016), (IA-2018), (IIA-2020)

Ans. In any triangle ABC, with usual notations.

$$\frac{a}{\sin \alpha} = \frac{b}{\sin \beta} = \frac{c}{\sin \gamma}$$

15: Define the law of cosines.

(IA-2015), (IIA-2017), (IA-2019)

Ans. In any triangle ABC, with usual notations.

- i. $a^2 = b^2 + c^2 - 2bc \cos \alpha$
- ii. $b^2 = c^2 + a^2 - 2ca \cos \beta$
- iii. $c^2 = a^2 + b^2 - 2ab \cos \gamma$

16: Define angles of Elevation and Depression.

(IA-2017), (IA-2018), (IIA-2018)

Ans. Angle of elevation: If the line of sight is upward from the horizontal, the angle is called angle of Elevation.

Angle of depression: If the line of sight is downward from the horizontal, the angle is called angle of Depression.

** P A P E R - B **

Chapter # 08

1: What is a scalar? Give examples.

Ans. A scalar is a quantity having magnitude only but no direction.

Examples: Length, Mass, Time, Volume, etc.

2: What is a vector? Give examples.

Ans. A vector is a quantity having both magnitude and direction.

Examples: Force, Velocity, Acceleration, etc.

3: What is a unit vector?

Ans. A vector whose magnitude is unity is called a unit vector.

4: What are parallel vectors?

(IA-2019)

Ans. Two vectors \vec{a} and \vec{b} are parallel if there exist a non-zero $k \in \mathbb{R}$, such that $\vec{a} = k\vec{b}$.

5: Define scalar product of two vectors.

(IIA-2018)

Ans. The scalar product of two vectors \vec{a} & \vec{b} is denoted by $\vec{a} \cdot \vec{b}$ and defined as $\vec{a} \cdot \vec{b} = |\vec{a}| |\vec{b}| \cos \theta$

6: Define vector product.

(IA-2016), (IA-2018)

Ans. The vector product of two vectors \vec{a} & \vec{b} is denoted by $\vec{a} \times \vec{b}$ and is defined as $\vec{a} \times \vec{b} = |\vec{a}| |\vec{b}| \sin \theta \hat{n}$.

Chapter # 09

7: Define row and column matrices.

(IA-2017)

Ans. A matrix has only one row is called **row matrix**.

A matrix has only one column is called **column matrix**.

8: Define identity matrix.

(IA-2019)

Ans. A diagonal matrix in which all diagonal elements are 1 is called identity matrix.

9: Define symmetric matrix.

(IA-2015)

Ans. A square matrix A is said to be symmetric if $A^t = A$.

10: Define diagonal matrix.

(IA-2016), (IIA-2016), (IA-2018)

Ans. A square matrix in which all elements except diagonal elements are zero is called diagonal matrix.

11: Define scalar matrix.

(IIA-2017), (IIA-2020)

Ans. A diagonal matrix in which all diagonal elements are same is called scalar matrix.

12: Define rectangular matrix.

(IIA-2018)

Ans. A matrix in which no. of rows and no. of columns are not equal is called rectangular matrix.

13: Define the minor of an element of a matrix.

(IA-2018)

Ans. If $A = [a_{ij}]$ is a square matrix of order n , then minor of an element a_{ij} of A is denoted by M_{ij} is the determinant of order $(n-1, n-1)$ and which is obtained by deleting the i th row & j th column of A .

14: Define a co-factor of an element of a matrix.

(IIA-2019)

Ans. The number $C_{ij} = (-1)^{i+j} M_{ij}$, Where M_{ij} is the minor of element a_{ij} is called the cofactor of element a_{ij} .

Chapter # 10

15: Define plane figures.

(IIA-2015), (IA-2019)

Ans. Those figures which occupy an area with only two dimensions are called plane figures.

16: Define a triangle.

Ans. A plane figure bounded by three straight lines is called a triangle.

17: Define Isosceles triangles.

(IA-2015), (IA-2018), (IIA-2020)

Ans. A triangle whose two sides are equal and third side is different is called Isosceles triangle.

18: Define equilateral triangle.

(IA-2016)

Ans. A triangle whose all sides are equal in length is called equilateral triangle.

Chapter # 11

19: Define a quadrilateral.

Ans. A plane figure bounded by four straight lines is called a quadrilateral.

20: Define a rhombus.

(IIA-2017)

Ans. A quadrilateral having all sides are equal with unequal diagonals.

21: Define a cyclic quadrilateral and write its area.

(IA-2017)

Ans. A quadrilateral inscribed in a circle is known as a cyclic quadrilateral.

$$\text{Area} = \sqrt{(s-a)(s-b)(s-c)(s-d)}$$

Chapter # 12

22: Define a polygon.

(IA-2019)

Ans. A plane figure bounded by a finite number of straight lines is called polygon.

23: Define a regular polygon.

Ans. A polygon is said to be regular, when all its sides and angles are equal.

24: Define inscribed polygon (circumscribed circle).

(IA-2015), (IIA-2015), (IIA-2016), (IA-2018), (IIA-2020)

Ans. If a circle passes through the corners of a polygon, then this polygon is called inscribed polygon.

25: Define circumscribed polygon (inscribed circle)

(IA-2017), (IIA-2018)

Ans. If a polygon is drawn outside a circle, so that every side of the polygon touches the circle, then this polygon is called circumscribed polygon.

Chapter # 13

26: Define a circle.

Ans. The set of points whose distance from a fix point is constant.

27: Define diameter of a circle.

(IIA-2018)

Ans. A chord passing through the center of the circle is called a diameter.

28: Define chord of a circle.

Ans. A line segment whose end points are any two points of a circle is called a chord of the circle.

29: What are concentric circles.

(IIA-2019)

Ans. The circles with common center are called concentric circles.

30: Define a sector of the circle.

Ans. A part of a circle, lie between two radii and arc of circle.

31: Define a segment.

Ans. A part of a circle which is cut off by a straight line not passing through the center.

Chapter # 14

32: Define irregular figure.

Ans. A figure which is not uniform and regular in shape is called irregular figure.

Chapter # 15

33: Define polygon prism.

(IIA-2014)

Ans. A prism with a polygon base is known as polygon prism.

Chapter # 16

34: Define cylinder.

Ans. Cylinder is a solid figure generated by a straight line moving parallel to its original position, while its end describes a closed figure in a plane.

35: Define hollow circular cylinder.

(IIA-2018)

Ans. The space between two concentric cylinders is called Hollow Circular Cylinder.

36: Define Elliptic cylinder.

Ans. The cylinder with a base, is an ellipse is called an elliptic cylinder.

Chapter # 17

37: Define pyramids.

(IIA-2017), (IA-2019), (IIA-2019)

Ans. A pyramid is a solid, whose base is a plane polygon and sides being triangles that meet in a common vertex.

Chapter # 18

38: Define cone.

(IIA-2014), (IA-2018)

Ans. A cone is a solid figure generated by a line, one end of which is fixed and the other end describes a closed curve in a plane.

Chapter # 19

39: Define sphere.

(IA-2019)

Ans. A sphere is a solid bounded by a closed surface, every point of which is equidistance from a fixed point called the Centre.

40: Define spherical shell.

(IIA-2019)

Ans. A spherical shell is the region between two concentric spheres of different radius.