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MATHEMATICS -3

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AIMS

- To enable to calculate the areas of regular polygons, hexagons, octagon, hydraulic mean depth (HMD) of a channel, area occupied by water of circular culvert. Excavation work.
- To provide the ability to calculate volume of regular solids like pyramid frustum of pyramid, prismoid, wedge and area of curved surfaces.
- To enable to use the knowledge of gradient of a straight line in finding speed, acceleration etc.
- To enable to use the knowledge of conic in finding the girder of a railway bridge, cable of a suspension bridge and maximum height of an arch.
- To make understand the basic concept and techniques of composition and resolution of vectors and computing the resultant of vectors.

• SHORT DESCRIPTION

Menstruation : Area of rectangles, squares, triangles, quadrilaterals, parallelograms, rhombus, trapezium, circle, sector, segment; Volume of rectangular solids, prism, parallelepiped, pyramids, cones, spheres, frustum of pyramid and cone; Area of curved surface of prism, Cylinder cone, pyramid and frustum of cone.

Co-ordinate Geometry: Co-ordinates of a point, locus and its equation, straight lines, circles and conic.

Vector: Addition and subtraction, dot and cross product.

DETAIL DESCRIPTION

MENSURATION:

1 Apply the concept of area of triangle.

1.1 Find the area of triangle in the form,

i) $A = \frac{\sqrt{3}}{4} a^2$, a = length of a side of equilateral triangle.

ii) $A = \frac{c}{4} \sqrt{4a^2 - c^2}$, where a = length of equal sides, c = third side.

- iii) $A = \sqrt{s(s-a)(s-b)(s-c)}$, where a, b, c = length of the sides of a triangle and $2s$ is the perimeter of the triangle.

1.2 Use formula in 1.1 to solve problems.

2 Apply the concept of finding areas of quadrilateral & Parallelogram & finding areas of rhombus & trapezium.

2.1 Define quadrilateral & Parallelogram.

2.2 Find the areas of quadrilateral when off sets are given.

2.3 Find the areas of a parallelogram.

2.4 Solve problems using above formulae.

2.5 Define rhombus & trapezium.

2.6 Find the areas of rhombus when the diagonals are given.

2.7 Find the areas of trapezium in terms of its parallel sides and the perpendicular distance between them.

2.8 Solve problems related to rhombus & trapezium.

3 Apply the concept of finding areas of regular polygon.

3.1 Define a regular polygon.

3.2 Find the area of a regular polygon of n sides, when

i) The length of one side and the radius of inscribed circle are given.

ii) The length of one side and the radius of circumscribed circle are given.

3.3 Find the area of a regular.

a) Hexagon

b) Octagon when length of side is given.

3.4 Solve problems of the followings types:

A hexagonal polygon 6 m length of each side has a 20 cm width road surrounded the polygon. Find the area of the road.

4 Understand areas of circle, sector and segment.

- 4.1 Define circle, circumference, sector and segment.
- 4.2 Find the circumference and area of a circle when its radius is given.
- 4.3 Find the area of sector and segment of a circle.
- 4.4 Solve problems related to the above formulae.

5 Apply the concept of volume of a rectangular solid.

- 5.1 Define rectangular solid and a cube.
- 5.2 Find geometrically the volume of a rectangular solid when its length, breadth and height are given.
- 5.3 Find the volume and diagonal of a cube when side is given.
- 5.4 Solve problems with the help of 6.2 & 6.3.

6 Apply the concept of surface area, volume of a prism, parallelepiped and cylinder.

- 6.1 Define a prism, parallelepiped and a cylinder.
- 6.2 Explain the formulae for areas of curved surfaces of prism, parallelepiped and cylinder.
- 6.3 Explain the formulae for volume of prism, parallelepiped and cylinder when base and height are given.
- 6.4 Solve problems related to 7.2, 7.3.

7 Apply the concept of the surface area, volume of pyramid, cone and sphere.

- 7.1 Define pyramid, cone and sphere.
- 7.2 Explain the formula for areas of curved surfaces of pyramid, cone and sphere.
- 7.3 Explain the formula for volumes of pyramid, cone and sphere.
- 7.4 Solve problems related to 8.2, 8.3.

CO-ORDINATE GEOMETRY

8 Apply the concept of co-ordinates to find lengths and areas.

- 8.1 Explain the co-ordinates of a point.
- 8.2 State different types of co-ordinates of a point.
- 8.3 Find the distance between two points (x_1, y_1) and (x_2, y_2) .
- 8.4 Find the co-ordinates of a point which divides the straight line joining two points in certain ratio.
- 8.5 Find the area of a triangle whose vertices are given.
- 8.6 Solve problems related to co-ordinates of points and distance formula.

9 Apply the concept of locus & the equation of straight lines in calculating various Parameter.

- 9.1 Define locus of a point.
- 9.2 Find the locus of a point.
- 9.3 Solve problems for finding locus of a point under certain conditions.
- 9.4 Describe the Equation $x=a$ and $y=b$ and slope of a straight line.
- 9.5 Find the slope of a straight line passing through two point (x_1, y_1) and (x_2, y_2) .
- 9.6 Find the equation of straight lines:
 - (i) Point slope form.
 - (ii) Slope Intercept form.
 - (iii) Two points form.
 - (iv) Intercept form.
 - (v) Perpendicular form.
- 9.7 Find the point of intersection of two given straight lines.
- 9.8 Find the angle between two given straight lines.
- 9.9 Find the condition of parallelism and perpendicularity of two given straight lines.
- 9.10 Find the distances of a point from a line.

10 Apply the equations of circle, tangent and normal in solving problems.

10.1 Define circle, center and radius.

10.2 Find the equation of a circle in the form:

(i) $x^2 + y^2 = a^2$

(ii) $(x - h)^2 + (y - k)^2 = a^2$

(iii) $x^2 + y^2 + 2gx + 2fy + c = 0$

10.3 Find the equation of a circle described on the line joining (x_1, y_1) and (x_2, y_2) .

10.4 Define tangent and normal.

10.5 Find the condition that a straight line may touch a circle.

10.6 Find the equations of tangent and normal to a circle at any point.

10.7 Solve the problems related to equations of circle, tangent and normal.

11 Understand conic or conic sections.

11.1 Define conic, focus, Directorx and Eccentricity.

11.2 Find the equations of parabola, ellipse and hyperbola.

11.3 Solve problems related to parabola, ellipse and hyperbola.

VECTOR :

12 Apply the theorems of vector algebra.

- 12.1 Define scalar and vector.
- 12.2 Explain null vector, free vector, like vector, equal vector, collinear vector, unit vector, position vector, addition and subtraction of vectors, linear combination, direction cosines and direction ratios, dependent and independent vectors, scalar fields and vector field.
- 12.3 Prove the laws of vector algebra.
- 12.4 Resolve a vector in space along three mutually perpendicular directions
- 12.5 Solve problems involving addition and subtraction of vectors.

13 Apply the concept of dot product and cross product of vectors.

- 13.1 Define dot product and cross product of vectors.
- 13.2 Interpret dot product and cross product of vector geometrically.
- 13.3 Deduce the condition of parallelism and perpendicularity of two vectors.
- 13.4 Prove the distributive law of dot product and cross product of vector.
- 13.5 Explain the scalar triple product and vector triple product.
- 13.6 Solve problems involving dot product and cross product.