

## **SSC GD Constable Exam: Mensuration Syllabus Summary**

### **Overview:**

The Mensuration topic is a vital part of the Mathematics section in the SSC GD Constable Exam, contributing approximately 3–5 questions (6–10 marks out of 160 total marks) in the Computer-Based Examination (CBE). The syllabus focuses on calculating the perimeter, area, and volume of 2D and 3D geometric shapes, along with their applications in real-world scenarios. Questions test computational accuracy, formula application, and problem-solving skills at a 10th-grade level. The exam includes 80 questions (2 marks each, 0.50 negative marking per wrong answer) to be completed in 60 minutes.

### **Key Topics in Mensuration:**

1. 2D Shapes: Calculating perimeter and area of squares, rectangles, triangles, circles, and parallelograms.
2. 3D Shapes: Calculating surface area and volume of cubes, cuboids, cylinders, cones, and spheres.
3. Applications: Word problems involving real-world scenarios (e.g., painting walls, filling containers, fencing).
4. Conversions: Handling unit conversions (e.g.,  $\text{cm}^2$  to  $\text{m}^2$ , liters to  $\text{cm}^3$ ).
5. Composite Figures: Finding areas of figures made up of multiple shapes.
6. Perimeter and Circumference: Calculating boundaries of 2D shapes.
7. Surface Area: Total and curved surface areas of 3D shapes.
8. Volume Calculations: Determining the capacity of 3D shapes.

### **Important Formula and Techniques:**

1. 2D Shapes (Perimeter and Area):
  - Square:
    - Perimeter =  $4 \times \text{side}$
    - Area =  $\text{side}^2$
    - Example: Side = 5 cm, Perimeter =  $4 \times 5 = 20$  cm, Area =  $5^2 = 25$   $\text{cm}^2$ .
  - Rectangle:
    - Perimeter =  $2 \times (\text{length} + \text{breadth})$

- Area = length  $\times$  breadth
- Example: Length = 6 cm, Breadth = 4 cm, Perimeter =  $2 \times (6 + 4) = 20$  cm, Area =  $6 \times 4 = 24 \text{ cm}^2$ .
- Triangle:
  - Perimeter = Sum of sides ( $a + b + c$ )
  - Area =  $(1/2) \times \text{base} \times \text{height}$
  - Area (Heron's Formula) =  $\sqrt{s(s-a)(s-b)(s-c)}$ , where  $s = (a + b + c)/2$  (semi-perimeter)
  - Example: Sides 3 cm, 4 cm, 5 cm,  $s = (3 + 4 + 5)/2 = 6$ , Area =  $\sqrt{6(6-3)(6-4)(6-5)} = \sqrt{6 \times 3 \times 2 \times 1} = \sqrt{36} = 6 \text{ cm}^2$ .
- Circle:
  - Circumference =  $2\pi r$  ( $r$  = radius)
  - Area =  $\pi r^2$
  - Example: Radius = 7 cm, Circumference =  $2 \times (22/7) \times 7 = 44$  cm, Area =  $(22/7) \times 7^2 = 154 \text{ cm}^2$ .
- Parallelogram:
  - Perimeter =  $2 \times (\text{base} + \text{adjacent side})$
  - Area = base  $\times$  height
  - Example: Base = 5 cm, Height = 3 cm, Area =  $5 \times 3 = 15 \text{ cm}^2$ .

## 2. 3D Shapes (Surface Area and Volume):

- Cube:
  - Total Surface Area =  $6 \times \text{side}^2$
  - Volume =  $\text{side}^3$
  - Example: Side = 4 cm, Surface Area =  $6 \times 4^2 = 96 \text{ cm}^2$ , Volume =  $4^3 = 64 \text{ cm}^3$ .
- Cuboid:
  - Total Surface Area =  $2 \times (lb + bh + hl)$  ( $l$  = length,  $b$  = breadth,  $h$  = height)
  - Volume =  $l \times b \times h$
  - Example:  $l = 5 \text{ cm}$ ,  $b = 3 \text{ cm}$ ,  $h = 2 \text{ cm}$ , Surface Area =  $2 \times (5 \times 3 + 3 \times 2 + 5 \times 2) = 62 \text{ cm}^2$ , Volume =  $5 \times 3 \times 2 = 30 \text{ cm}^3$ .
- Cylinder:
  - Curved Surface Area =  $2\pi rh$
  - Total Surface Area =  $2\pi r(r + h)$

- Volume =  $\pi r^2 h$
- Example:  $r = 7$  cm,  $h = 10$  cm, Curved Surface Area =  $2 \times (22/7) \times 7 \times 10 = 440$  cm<sup>2</sup>, Volume =  $(22/7) \times 7^2 \times 10 = 1540$  cm<sup>3</sup>.
- Cone:
  - Curved Surface Area =  $\pi r l$  ( $l$  = slant height,  $l = \sqrt{r^2 + h^2}$ )
  - Total Surface Area =  $\pi r(l + r)$
  - Volume =  $(1/3) \times \pi r^2 h$
  - Example:  $r = 3$  cm,  $h = 4$  cm,  $l = \sqrt{3^2 + 4^2} = 5$  cm, Curved Surface Area =  $(22/7) \times 3 \times 5 = 47.14$  cm<sup>2</sup>, Volume =  $(1/3) \times (22/7) \times 3^2 \times 4 = 37.71$  cm<sup>3</sup>.
- Sphere:
  - Surface Area =  $4\pi r^2$
  - Volume =  $(4/3) \times \pi r^3$
  - Example:  $r = 7$  cm, Surface Area =  $4 \times (22/7) \times 7^2 = 616$  cm<sup>2</sup>, Volume =  $(4/3) \times (22/7) \times 7^3 = 1437.33$  cm<sup>3</sup>.

### 3. Unit Conversions:

- Area:  $1 \text{ m}^2 = 10,000 \text{ cm}^2$ , 1 hectare = 10,000 m<sup>2</sup>.
- Volume: 1 liter = 1000 cm<sup>3</sup>,  $1 \text{ m}^3 = 1,000,000 \text{ cm}^3$ .
- Example:  $2 \text{ m}^2 = 2 \times 10,000 = 20,000 \text{ cm}^2$ .

### 4. Word Problem Applications:

- Example (Area): Cost to paint a wall  $5 \text{ m} \times 4 \text{ m}$  at ₹10/m<sup>2</sup> = Area  $\times$  Cost =  $(5 \times 4) \times 10 = ₹200$ .
- Example (Volume): Time to fill a tank  $2 \text{ m} \times 1 \text{ m} \times 0.5 \text{ m}$  at 1000 liters/hour = Volume  $\div$  Rate =  $(2 \times 1 \times 0.5 \times 1000) / 1000 = 1$  hour.
- Example (Composite Figure): Area of a path around a  $10 \text{ m} \times 8 \text{ m}$  garden with 1 m width = Total Area – Garden Area =  $(12 \times 10) - (10 \times 8) = 120 - 80 = 40 \text{ m}^2$ .

### **Key Points for SSC GD Preparation:**

- Focus Areas: Calculating areas, perimeters, and volumes of 2D and 3D shapes, and solving word problems (e.g., painting, fencing, tank filling) are frequently tested.

- Question Types: Direct calculations (e.g., area of a rectangle), volume of 3D shapes, composite figure problems, and word problems (e.g., cost of painting a wall).
- Difficulty Level: 10th-grade level, requiring accurate formula application and quick calculations.
- Practice Tips: Memorize formulas for 2D and 3D shapes, practice unit conversions, and solve word problems from past SSC GD papers to improve speed and accuracy.

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