UNIT-V

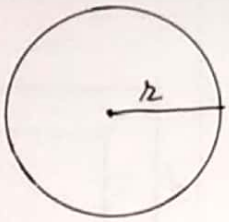
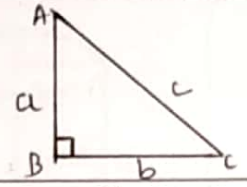
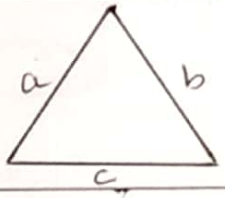
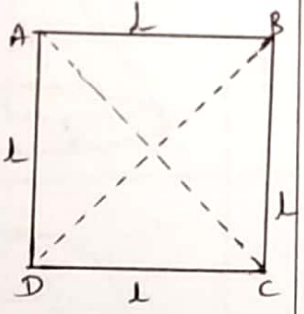
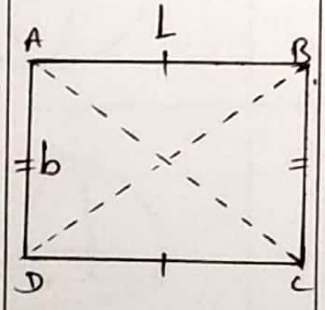
MARKS-10

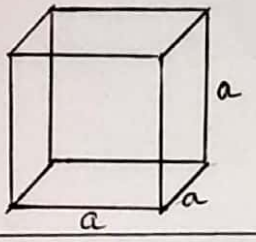
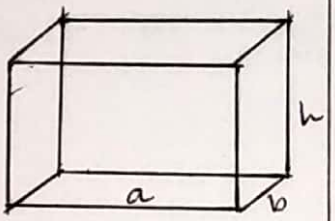
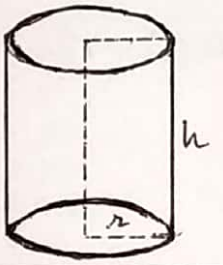
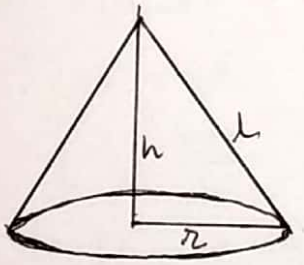
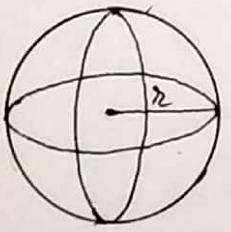
MENSURATION

(MCQS-03MARKS,EXAMPLES-07 MARKS)

UNIT - V

MENSURATION (10 Marks)

SR. NO	OBJECT	FIGURE	PERIMETER	AREA.
1	CIRCLE		→ $d = 2r$ $r = d/2$ $2\pi r$ OR πd.	πr^2
2	TRIANGLE		$P = a+b+c$	$A = \frac{1}{2} b h$
			$P = a+b+c$	$A = \sqrt{s(s-a)(s-b)(s-c)}$ where $s = \frac{a+b+c}{2}$
3	SQUARE		$P = 4L$	$A = L^2$
4	RECTANGLE		$P = 2(L+b)$	$A = L \times b$

SR. NO	OBJECT	FIGURE	CURVED SURFACE AREA	TOTAL SURFACE AREA	VOLUME
1	CUBE		–	$6a^2$	a^3
2	CUBOID		–	$2(ab+bh+ah)$	abh
3	CYLINDER		$2\pi rh$	$2\pi rh+2\pi r^2$ $=2\pi r(h+r)$	$\pi r^2 h$
4	CONE		πrl l = slant height	$\pi rl+\pi r^2$ $=\pi r(l+r)$	$\frac{1}{3}\pi r^2 h$
5	SPHERE		$4\pi r^2$	$4\pi r^2$	$\frac{4}{3}\pi r^3$
6	HEMISPHERE		$2\pi r^2$	$2\pi r^2+\pi r^2$ $=3\pi r^2$	$\frac{2}{3}\pi r^3$

* Question for 1 Marks

1. If the Diameter of the circle is 28 cm then find its circumference.

→ $d = 28$ cm

$r = \frac{d}{2} = \frac{28}{2} = 14$ cm

Circumference of circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times 14^{2}$

$= 88$ cm.

2. Find the area of square made from 120 m long wire.

→ perimeter of square is 120 m.

perimeter of square $= 4l$

$\therefore 120 = 4l$

$\therefore l = \frac{120}{4}$

$\therefore \boxed{l = 30 \text{ m}}$

Area of square $A = l^2$

$= (30)^2$

$= 900 \text{ m}^2$.

3. If Triangle ABC is an equilateral triangle and side BC = 6 Cm then find the area of triangle ABC.

- For equilateral triangle.

$AB = BC = AC = 6$ cm.

$= a$

→ Area of equilateral triangle $= \frac{\sqrt{3}}{4} a^2$

$$= \frac{\sqrt{3}}{4} (6)^2$$

$$= \frac{\sqrt{3}}{4} 36^9$$

$$\therefore \boxed{A = 9\sqrt{3} \text{ cm}^2}$$

4. If r is the radius of the circle then given the formula for its circumference and area.

→ $C = 2\pi r$

$A = \pi r^2$

5. Find the area of circle made from 132 m long wire.

→ circumference of circle is 132 m.

Circumference of circle $= 2\pi r$

$$\therefore 132 = 2\pi r.$$

$$\therefore \frac{132^{66^3} \times 7}{2 \times 22} = r$$

$$\therefore 21 = r$$

$$\therefore \boxed{r = 21 \text{ m.}}$$

Area of circle $= \pi r^2$

$$= \frac{22}{7} \times 21^3 \times 21$$

$$= 1386 \text{ sq. cm.}$$

6. In a Trapezium two parallel sides are 8 cm and 12 cm. and perpendicular distance between two parallel sides is 6 cm. Find the area of Trapezium.

→ $a = 8\text{cm}$

$b = 12\text{ cm}$.

And $d = 6\text{ cm}$.

Area of Trapezium $= \frac{1}{2}(a+b) \times d$.

$= \frac{1}{2}(8+12) \times 6$

$= \frac{1}{2} 20^{10} \times 6$

$\boxed{A = 60\text{ sq. cm.}}$

7. If the length of diagonal of rhombus is 8 cm and 15 cm. Find the area of rhombus.

→ Here $d_1 = 8\text{cm}$, $d_2 = 15\text{ cm}$.

Area of Rhombus $= \frac{1}{2} d_1 d_2$

$= \frac{1}{2} \times 8^{4} \times 15$

$= 60\text{ sq. cm.}$

8. If the ratios of the radius of two circles are 2:3 then find the ratio of their Areas.

→ Let $r_1 = 2$ & $r_2 = 3$.

Area of circle $= \pi r_1^2$, Area of circle $= \pi r_2^2$

$= \pi \times 4$ $= \pi \cdot 9$

Ratio of Area of circle $= \frac{\pi r_1^2}{\pi r_2^2}$

$= \frac{4}{9}$

Ratio of Area of circle is. $4:9$

9. Find the volume of a hemisphere having radius 2 meter.

→ $r = 2$ meter.

Volume of hemisphere $= \frac{2}{3}\pi r^3$

$= \frac{2}{3} \times \pi \times 8$

$= \frac{2}{3} \times \frac{22}{7} \times 8$

$= \frac{352}{21}$

$= 16.8\ m^3$.

10. The radius of the sphere is 10 cm and its height is 14 cm then find its area of its curved surface.

→ Here $r = 10$ cm

$h = 14$ cm.

Curved surface area of sphere $= 4\pi r^2$

$= 4 \times \frac{22}{7}$

Note :- Question is wrong. So example cancle.

11. The radius of the base of cylinder is 10 cm and their heights are 14 cm. then find area of its curved surface.

→ Here $r = 10$ cm, $h = 14$ cm.

curved surface area of cylinder

$$= 2\pi r(h + r)$$

$$= 2 \times \frac{22}{7} \times 10\,(14 + 10)$$

$$= 2 \times \frac{22}{7} \times 10\,(24)$$

$$= \frac{2 \times 22 \times 240}{7}$$

$$= \frac{44 \times 240}{7}$$

$$= 1508.57 \text{ cm}^2$$

12. Give formula of volume of hemisphere.

$$V = \frac{2}{3}\pi r^3$$

13. Give formula of surface area of cube

$$S = 6l^2$$

* Question for 3 Marks

1. If measurement of sides of triangle are 7, 8 & 9 cm then find its area.

→ Let $a = 7, b = 8, c = 9$.

Area of Triangle

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

But $s = \frac{a+b+c}{2}$

$$= \frac{7+8+9}{2} = \frac{24}{2} = 12 \text{ cm}$$

$$\therefore \boxed{s = 12 \text{ cm}}$$

Now, $A = \sqrt{s(s-a)(s-b)(s-c)}$

$$= \sqrt{12(12-7)(12-8)(12-9)}$$

$$= \sqrt{12 \times 5 \times 4 \times 3}$$

$$= \sqrt{12 \times 12 \times 5}$$

$$\boxed{A = 12\sqrt{5} \text{ cm}^2}$$

2. Find area of isosceles triangle whose same sides are of length 13 cm and base is of length of 24 cm.

→ Here $AB = AC = 13$ cm and $BC = 24$ cm

$a = c = 13$ cm & $b = 24$ cm

$$s = \frac{a+b+c}{2} = \frac{13+24+13}{2} = \frac{50}{2} = 25 \quad \therefore \boxed{s = 25 \text{ cm}}$$

→ Area of isosceles triangle =

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{25(25-13)(25-24)(25-13)}$$

$$= \sqrt{25(12)(1)(12)}$$

$$= 12 \times 5$$

$$\boxed{A = 60 \text{ sq. cm}}$$

3. Find Volume of a cylinder whose radius is 5 cm. and height is 12 cm. ($\pi = 3.14$).

→ $r = 5$ cm, $h = 12$ cm.

Volume of cylinder $V = \pi r^2 h$

$$= 3.14 \times 5 \times 5 \times 12$$

$$= \frac{314}{10} \times \frac{5}{25} \times \cancel{12}^{6}$$

$$= 314 \times 30$$

$$\boxed{V = 9420 \text{ cm}^3}$$

4. Find Volume of a cone whose diameter is 20 cm. and altitude is 15 cm.

→ Here $d = 20$ cm $\quad h = 15$ cm.

$$\therefore r = \frac{d}{2} = \frac{20}{2} = 10 \text{ cm.}$$

Volume of cone $= \frac{1}{3} \pi r^2 h$

$$= \frac{1}{\cancel{3}} \times 3.14 \times 10 \times 10 \times \cancel{15}^{5}$$

$$\boxed{V = 1570 \text{ cm}^3}$$

6. The side of a rectangular plot are in the ratio 3:2, if the area of the plot is 600 sq. met. Then find the perimeter of the plot.

→ Here $3x \times 2x = 600$

$\therefore 6x^2 = 600$

$\therefore x^2 = 100$

$\therefore x = 10.$

Here one side is $3x = 3 \times 10 = 30$ m

and another side is $2x = 2 \times 10 = 20$ m

Now perimeter of Rectangular plot

$= 2(l + b)$

$= 2(30 + 20)$

$= 2(50)$

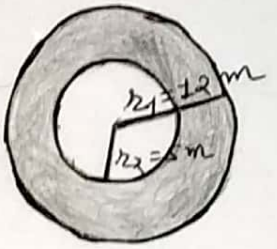
$= 100$ m

$\therefore$ **P = 100 m**

7. A circular garden has radius 12 met. A path of 7 met. wide has to be constructed on side periphery of the garden. Find cost of path at the rate of Rs 50 per m^2.

→ Here $r_1 = 12$.

$r_2 = 12 - 7 = 5$.



Area of path $= \pi (r_1^2 - r_2^2)$

$= 3.14 (144 - 25)$

$= 3.14 (119)$

$= 373.5\ m^2$.

cost of path at the rate of Rs 50 per m^2

∴ cost of path at area $373.5 m^2$ is

$373.5 \times 50 = 18,675$ Rs.

8. A cylinder is made from a cone with radius 35 cm and height 12 cm. If the radius of cylinder is 7 cm then find the height.

→ Here Radius of cone $r_1 = 35$ cm & $h_1 = 12$ cm

and radius of cylinder $r_2 = 7$ cm, $h_2 = (?)$

Given that

Volume of cone = volume of cylinder.

$\therefore \frac{1}{3} \pi r_1^2 h_1 = \pi r_2^2 h_2$

$$\therefore \frac{1}{3} \times 35 \times 35 \times 12 = 7 \times 7 \times h_2$$

$$\therefore \boxed{h_2 = 100 \text{ cm}}$$

∴ So, height of cylinder is $h_2 = 100$ cm.

9. Find the surface area and volume of cylinder with 7 cm radius and 21 cm height.

→ Here $r = 7$ cm, $h = 21$ cm.

→ surface area of cylinder $= 2\pi r(h + r)$

$= 2 \times 3.14 \times 7 (21 + 7)$

$= 14 \times 3.14 (28)$

$= 1230.59$ cm.

→ Volume of cylinder $V = \pi r^2 h$

$= 3.14 \times 7 \times 7 \times 21$

$\therefore \boxed{V = 3231 \text{ cm}^3}$

10. How many spherical balls of 2cm radius can be made from cube of length 44 cm.

→ No of spherical balls $= \dfrac{\text{Volume of cube}}{\text{volume of sphere}}$

$= \dfrac{l^3}{\frac{4}{3}\pi r^3} = \dfrac{3 \times (44)^3 \times 7}{4 \times 22 \times 8}$

$= 2541.$

* Question for 4 Marks :-

1. The sides of the triangle are in the ratio 3:4:5 and perimeter of triangle is 120 cm. then find the area of triangle.

→ Here $3x + 4x + 5x = 120$

$\therefore 12x = 120$

$\therefore x = \frac{120}{12}$

$\therefore x = 10$ cm.

Now, sides of Triangle is measure of

$a = 3x = 3 \times 10 = 30$ cm

$b = 4x = 4 \times 10 = 40$ cm

$c = 5x = 5 \times 10 = 50$ cm.

Now, $s = \frac{a+b+c}{2} = \frac{30+40+50}{2} = \frac{120}{2} = 60$

Area of Triangle

$A = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{60(60-30)(60-40)(60-50)}$

$= \sqrt{60 \times 30 \times 20 \times 10}$

$= \sqrt{60 \times 60 \times 10}$

$\boxed{A = 60\sqrt{10} \text{ cm}^2}$

2. If area of circle is 154 sq. m. Then find its circumference Find total expense of fencing on the circle at the rate of Rs. 200 per meter.

→ Area of circle = 154

$\therefore \pi r^2 = 154$

$\therefore r^2 = \frac{154 \times 7}{22}$

$\therefore r^2 = 49$

$\therefore \boxed{r = 7 \text{ m.}}$

→ circumference of circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times 7$

$= 44 \text{m.}$

Total expense of fencing on the circle at the rate of Rs 200 per meter.

Then cost of fencing is $44 \times 200 = 8800$ Rs.

3. A tank for a petrol pump has a capacity 38500 liter and the diameter of tank is 3.5 meter find the height of the tank.

→ 38500 liter

1000 liter $= 1 \text{ m}^3$

$\therefore$ 38500 liter $= 38.5 \text{ m}^3$

$d = 3.5 \text{ m.} \quad r = \frac{d}{2} = \frac{3.5}{2} = \frac{35}{20}$

Volume of cylinder $V = \pi r^2 h$

$\therefore 38.5 = \frac{22}{7} \times \frac{35}{20} \times \frac{35}{20} \times h$

$$\therefore h = \frac{38.5 \times 8}{77}$$

$$\therefore \boxed{h = 4 \text{ met}}$$

4. A cylinderical tank of radius 8 m and height 10 m is filled full of oil. If the oil is transferred to cuboids tank of length 15 m and width 14 m. Find the height of oil in the cuboids tank.

→ $r_1 = 8$ m, $h_1 = 10$ m

$l = 15$ m $\quad b = 14$ m.

Volume of cylinder = Volume of cuboid.

$$\therefore \pi r_1^2 h_1 = lbh$$

$$\therefore \frac{22}{7} \times 8 \times 8 \times 10 = 15 \times 14 \times h$$

$$\therefore h = \frac{22 \times 8 \times \overset{4}{\cancel{8}} \times \overset{2}{\cancel{10}}}{7 \times \underset{3}{\cancel{15}} \times \cancel{14}_{7}}$$

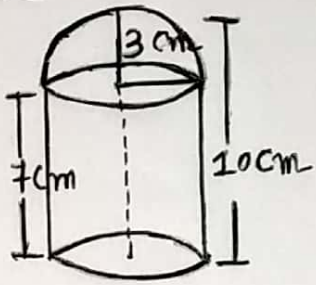
$$\therefore h = \frac{22 \times 64}{49 \times 3}$$

$$\therefore \boxed{h = 10 \text{ m}}$$

5. A hemisphere of radius 3 cm is mounted on cylinder of same radius and 10 cm height. Find volume and surface area of the shape.

→ $h = 10$ cm, $h_1 = 7$ cm, $r = 3$ cm.

→ surface area of cylinder
+ surface area of Hemisphere
= surface area of shape



$\therefore 2\pi r(h_1+r) + 3\pi r^2$
= surface area of shape.

$\therefore 2 \pi 3(7+3) + 3 \pi 9 =$ "

$\therefore 60\pi + 27\pi$ = surface area of shape.

$\therefore$ surface area of shape $= 87\pi$ cm^2.

→ Volume of shape = Volume of cylinder
+ Volume of Hemisphere.

$= \pi r^2 h_1 + \frac{2}{3}\pi r^3$

$= \pi 9 \times 7 + \frac{2}{3}\pi 27^{9}$

$= 63\pi + 18\pi$

$= 81\pi$ cm^3

6. Cuboid of 15 cm length and 10 cm width is made from cylinder of radius 5 cm and height 20 cm. what is the height of cuboids?

→ Here $l = 15$ cm, $b = 10$ cm, $h = ?$
and $r = 5$cm $h_1 = 20$ cm.

→ Volume of cuboid = Volume of cylinder

$\therefore lbh = \pi r^2 h_1$

$\therefore 15 \times 10 \times h = \pi \times 5 \times 5 \times 20$

$\therefore h = \dfrac{\cancel{25}^{5} \times \cancel{20}^{2} \pi}{\cancel{15} \times \cancel{10}_{3}}$

$\therefore \boxed{h = \dfrac{10\pi}{3} \text{ cm.}}$

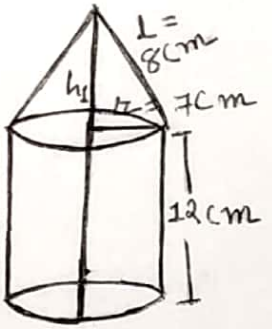
7. A cone of radius 7 cm, slant height 8 cm is mounted on cylinder of 7 cm radius and 12 cm height. Find surface area of the shape. Also find height of cone.

→ Here $r = 7$ cm

$l = 8$ cm

$h = 12$ cm

$h_1 = (?)$



by Pythagoras Rule

$l^2 = r^2 + h_1^2$

$\therefore h_1^2 = l^2 - r^2$

$\therefore \quad = 64 - 49$

$h_1^2 = 15$ cm $\quad \therefore h_1 = \sqrt{15}$ cm.

→ surface area of the shape = surface area of cone + surface area of cylinder

$= \pi r(l + r) + 2\pi r(h + r)$

Surface area of the shape

$= \pi(7)(8+7) + 2\pi(7)(12+7)$

$= 7\pi(15) + 14\pi(19)$

$= 105\pi + 266\pi$

$= 371\pi \text{ cm}^2$