Surface Area and volume of A Right Circular cone Ex 20.1 Q18

Answer :

The tent being in the form of a cone surmounted on a cylinder the total amount of canvas required would be equal to the sum of the curved surface areas of the cone and the cylinder.

The diameter of the cylinder is given as 24 m. Hence its radius, $r = 12$ m. The height of the cylinder, $h = 11$ m.

The curved surface area of a cylinder with radius 'r' and height 'h' is given by the formula

Curved Surface Area of the cylinder = $2\pi rh$

Substituting the values of $r = 12$ m and $h = 11$ m in the above equation

Curved Surface Area of the cylinder = $2(\pi)(12)(11)$

$= 264\pi$

The vertex of the cone is given to be 16 m above the ground and the cone is surmounted on a cylinder of height 11 m, hence the vertical height of the cone is $h = 5$ m. The radius of the cone is the same as the radius of the cylinder and so base radius, $r = 12$ m.

To find the slant height 'l' to be used in the formula for Curved Surface Area we use the following relation

Slant height, $l = \sqrt{r^2 + h^2}$

$= \sqrt{12^2 + 5^2}$

$= \sqrt{144 + 25}$

$= \sqrt{169}$

$l = 13$ m

The formula of the curved surface area of a cone with base radius 'r' and slant height 'l' is given as

Curved Surface Area = πrl

Substituting the values of $r = 12$ m and $l = 13$ m in the above equation

We get

Curved Surface Area of the cone = $\pi(12)(13)$

$= 156\pi$

Total curved surface area = Curved surface area of cone + curved surface area of cylinder

$= 156\pi + 264\pi$

$= 420\pi$

$= \frac{(420)(22)}{7}$

$= 1320$

Thus the total area of canvas required is $\boxed{1320 \text{ m}^2}$

Surface Area and volume of A Right Circular cone Ex 20.1 Q19

Answer :

We need to find out the total amount of canvas required to make the circus tent. The height of the cylindrical portion is given as $h = 3$ m, and the diameter is given as 105 m.

Hence the radius $r = \frac{105}{2}$ m.

The curved surface area of a cylinder with radius 'r' and height 'h' is given by the formula

Curved Surface Area of the cylinder = $2\pi rh$

Substituting the values of $r = \frac{105}{2}$ m and $h = 3$ m in the above equation

Curved Surface Area of the cylinder = $\frac{(2)(\pi)(105)(3)}{2}$

$= \frac{(22)(105)(3)}{7}$

$= (22)\ (15)\ (3)$

$= 990$

Hence the curved surface area of the cylinder is 990 m^2

The slant height of the cone is $l = 53$ m. The base radius of the cone is the same as the radius of the cylinder and hence $r = \frac{105}{2}$

The formula of the curved surface area of a cone with base radius 'r' and slant height 'l' is given as

Curved Surface Area = πrl

Substituting the values of $r = \frac{105}{2}$ m and $l = 53$ m in the above equation

We get

Curved Surface Area of the cone = $\frac{(22).(105).(53)}{(7)(2)}$

= 8745

Hence the curved surface area of the cone is 8745 m^2

Total curved surface area = Curved surface area of cone + curved surface area of cylinder

= 8745 + 990

= 9735

The total surface area of the tent is 9735 m^2

Now, the width (or) breadth of the canvas is 5 m.

Area of the canvas required = (Breadth of the canvas) (Length of the canvas)

Therefore,

Length of the canvas = $\frac{\text{Area of the canvas}}{\text{Breadth of the canvas}}$

= $\frac{9735}{5}$

= 1947

Hence the length of canvas required is $\boxed{1947 \text{ m}}$

********** END **********