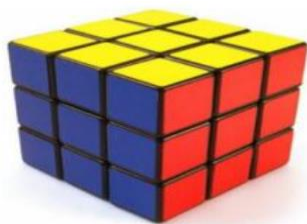


CHAPTER-13
SURFACE AREA & VOLUMES
04 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	A room is in the form of a cylinder surmounted by a hemispherical dome. The base radius of hemisphere is one half the height of cylindrical part . Find the total height of the room if it contains $1408/21 \text{ m}^3$ of air.	
2.	Krishnanagar is a small town in Nadia District of West Bengal. Krishnanagar clay dolls are unique in their realism and quality of their finish. They are created by modelling coils of clay over a metal frame. The figures are painted in natural colours and their hair is made either by sheep's wool or jute. Artisans make models starting from fruits, animals, God, goddess, farmer, fisherman, weavers to Donald Duck and present comic characters. These creations are displayed in different national and international museums. 300 600 A D B C Here are a few images (not to scale) of some clay dolls of Krishnanagar. The blue doll of Doll-3 is melted and its clay is used to make the cylindrical drum of Doll-4. If the radius of the drum is also 3cm, find the height of the drum. Doll-1 Doll-2 Doll-3 Doll-4	
3.	One day Rohit was going home from school, saw a carpenter working on wood. He found that he is carving out a cone of same height and same diameter from a cylinder. The height of the cylinder is 24 cm and base radius is 7 cm. While watching this, some questions came into Rohit's mind. Help Rohit to find the answer of the following questions. - Find the slant height of the conical cavity so formed. - What is the curved surface area of the conical cavity so formed? Also, find the volume of conical cavity. - Find the external curved surface area of the cylinder.	
4.	- Mr Lal has a gowdan where an object is there in the shape of a cylinder with two hemispherical ends. If the total length of the object is 60cm and diameter is 25cm Find the volume of the object (take $\pi = 3.14$) - He wants to pack it in a cuboidal container to sent to a shop. What is the volume of the smallest such box.	
5.	Aahana went to a store and there she saw a beautiful spherical table lamp with wooden stand. She noticed that the wooden stand is made up of 6 identical cuboidal blocks each having dimensions 7cm x 1cm x 1cm. She wants to paint it with golden colour. Help her in finding - The volume of wood used - Surface area of stand to be painted.	4

	(c) If cost of painting is 50 paise per sq. meter, then find the total cost of painting. 	
6.	The diameter of a cylindrical roller is 90 cm and it is 110 cm long. If it takes 560 complete revolutions to level a children's playground, then what will be the cost of levelling the playground at the rate of ₹ 5 per square metre. 	4
7.	A toy is in the form of a hemisphere surmounted by a right circular cone of the same base radius as that of the hemisphere. If the radius of base of the cone is 21 cm and its volume is $\frac{2}{3}$ of the volume of the hemisphere, calculate the height of the cone and the surface area of the toy.	4
8.	From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm^2. [Use $\pi = \frac{22}{7}$]	4
9.	On a Sunday, your Parents took you to a fair. You could see lot of toys displayed, and you wanted them to buy a RUBIK's cube and strawberry ice-cream for you. Observe the figures and answer the questions:-	4



1. The length of the diagonal if each edge measures 6cm is
a) $3\sqrt{3}$ b) $3\sqrt{6}$ c) $\sqrt{12}$ d) $6\sqrt{2}$
2. Volume of the solid figure if the length of the edge is 7cm is
a) 256 cm^3 b) 196 cm^3 c) 343 cm^3 d) 434 cm^3
3. What is the curved surface area of hemisphere (ice cream) if the base radius is 7cm?
a) 309 cm^2 b) 308 cm^2 c) 803 cm^2 d) 903 cm^2
4. The total surface area of cone with hemispherical ice cream if the radius is 7cm and the height of the cone is 24 cm
a) 858 cm^2 b) 885 cm^2 c) 588 cm^2 d) 855 cm^2

10. Rahul and Rohit have 12 and 8 coins respectively. Each of radius 3.5 cm and thickness 0.5 cm. They place their coins one above the other to form solid cylinder.

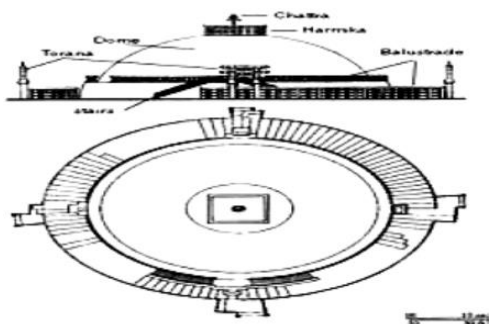


Based above information answer the following questions :

1. Curved surface area of the cylinder made by Rahul is
a) 144 cm^2 b) 132 cm^2 c) 154 cm^2 d) 142 cm^2
2. The ratio of the curved surface area of the cylinder made by Rahul and Rohit
a) 2 : 5 b) 3 : 2 c) 1 : 2 d) 2 : 7
3. The volume of the cylinder made by Rohit is
a) 154 cm^3 b) 144 cm^3 c) 132 cm^3 d) 142 cm^3
4. When two coins are shifted from Rahul's Cylinder to Rohit's cylinder then
(a) Volume of Rahul's Cylinder > volume of Rohit's cylinder
(b) Volume of Rohit's Cylinder > volume of

	³ (d) 210.60 cm ³ iii) Which container had more juice and how much? a) hemispherical cup, 195 cm ³ (b) cylindrical glass, 207 cm ³ (c) hemispherical cup, 280.85 cm ³ (d) cylindrical glass, 314.42 cm ³	
14.	On a Sunday, you are going with your parents to your uncle's house. A room of this house is 8 m long, 4.5 m wide and 2.8 m high. It has one door 1.4 m wide and 2 m high with a semi-circular ventilator and two rectangular windows 2 m by 1.5 m each as shown in the given figure:  i) What is the area of inner four walls? a) 70 m ² (b) 100 m ² c) 35 m ² (d) 140 m ² ii) The area of semi circular ventilator is a) 70 m ² (b) 0.77 m ² c) 0.70 m ² (d) 7.7 m ² iii) The cost of white washing the inner four walls of the room at the rate of Rs 10 per square cm _____ a) Rs 660.40 (b) Rs 892.50 c) Rs 604.30 (d) Rs 1000	4
15.	The Great Stupa at Sanchi is one of the oldest stone structures in India, and an important monument of Indian Architecture.	4

It was originally commissioned by the emperor Ashoka in the 3rd century BCE. Its nucleus was a simple hemispherical brick structure built over the relics of the Buddha. It is a perfect example of combination of solid figures. A big hemispherical dome with a cuboidal structure mounted on it. (Take $\pi = 22/7$)



(i) Calculate the volume of the hemispherical dome if the height of the dome is 21 m –

- a) 19404 cu. m b) 2000 cu. m
c) 15000 cu. m d) 19000 cu. m

(ii) The formula to find the Volume of Sphere is-

- a) $\frac{2}{3} \pi r^3$ b) $\frac{2}{3} \pi r^3$ c) $4 \pi r^2$ d) $2 \pi r^2$

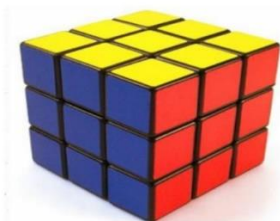
(iii) The cloth require to cover the hemispherical dome if the radius of its base is 14m is

- a) 1222 sq. m b) 1232 sq. m
c) 1200 sq. m d) 1400 sq. m

(iv) The total surface area of the combined figure i.e. hemispherical dome with radius 14m and cuboidal shaped top with dimensions 8m x 6m x 4m is

- a) 1200 sq. m b) 1232 sq. m
c) 1392 sq. m d) 1932 sq. m

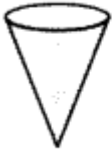
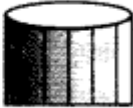
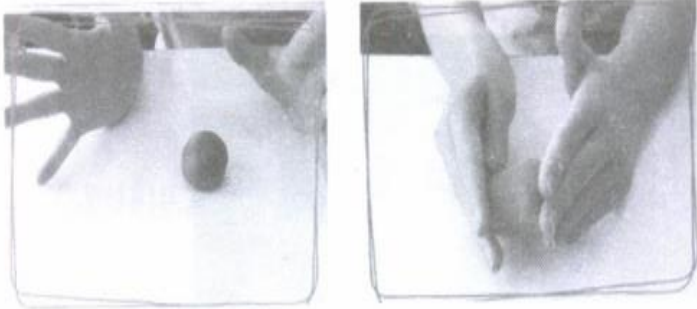
16. On a Sunday, your parents took you to a fair. You could see a lot of toys displayed, and you wanted them to buy a RUBIK's cube and strawberry ice-cream for you.



(i) The length of the diagonal if each edge measures 6cm is:

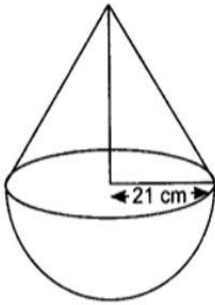
- (a) $3\sqrt{3}$ (b) $3\sqrt{6}$ (c) $\sqrt{12}$ (d) $6\sqrt{3}$

	(ii) Volume of the solid if the length of the edge is 7cm: (a) 256cm^3 (b) 196cm^3 (c) 343cm^3 (d) 434cm^3 (iii) What is the CSA of hemisphere (ice-cream) if the base radius is 7cm? (a) 309cm^2 (b) 308cm^2 (c) 803cm^2 (d) 903cm^2 (iv) Slant height of a cone if the radius is 7cm and the height is 24cm. (a) 26cm (b) 25cm (c) 52cm (d) 62cm	
17.	The Great Stupa at Sanchi is one of the oldest stone structures in India, and an important monument of Indian Architecture. It was originally commissioned by the emperor Ashoka in the 3rd century BCE. Its nucleus was a simple hemispherical brick structure built over the relics of the Buddha. It is a perfect example of combination of solid figures. A big hemispherical dome with a cuboidal structure mounted on it. (Take $\pi = 22/7$) i) The volume of the hemispherical dome if the height of the dome 21 m, is: a) 19404 m^3 b) 2000 m^3 c) 15000 m^3 d) 19000 m^3 ii) The formula for finding the volume of a hemi-sphere of radius r is: a) $\frac{2}{3}\pi r^3$ b) $\frac{4}{3}\pi r^3$ c) $4\pi r^2$ d) $2\pi r^2$ iii) The volume of the cuboidal shaped top with dimensions 8m x 6m x 4m is: a) 182.45 m^3 b) 282.45 m^3 c) 292 m^3 d) 192 m^3	4
18.	On a Sunday, your Parents took you to a fair. You could see lot of toys displayed, and you wanted them to buy a RUBIK's cube and strawberry ice-cream for you. Observe the figures and answer the questions:- i) The length of the diagonal, if each edge measure 6 cm, is: a) $3\sqrt{3}\text{ cm}$ b) $3\sqrt{6}\text{ cm}$ c) $2\sqrt{3}\text{ cm}$ d) $6\sqrt{3}\text{ cm}$ ii) Volume of the solid figure, if the length of the edge is 7 cm, is: a) 256cm^3 b) 196cm^3 c) 343cm^3 d) 434cm^3 iii) What is the curved surface area of hemisphere if the base radius is 7 cm? a) 309cm^2 b) 308cm^2 c) 803cm^2 d) 903cm^2	4
19.	An icecream seller sells his icecreams in two ways: (A) In a cone of $r = 5\text{ cm}$, $h = 8\text{ cm}$ (B) In a cup in shape of cylinder with $r = 5\text{ cm}$, $h = 8\text{ cm}$	4

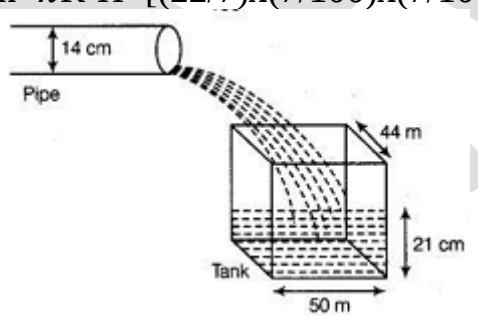
	  He charges the same price for both but prefers to sell his icecream in a cone. (a) Find the volume of the cone. (b) Find the volume of the cup. (c) Which out of the two has more capacity?	
20.	To make the learning process more interesting, creative and innovative, Amayras class teacher brings clay in the classroom, to teach the topic - Surface Areas and Volumes. With clay, she forms a cylinder of radius 6 cm and height 8 cm. Then she moulds the cylinder into a sphere and asks some questions to students.  (i) The radius of the sphere so formed is (a) 4 cm (b) 6 cm (c) 7 cm (d) 8 cm (ii) The volume of the sphere so formed is (a) 905.14 cm^3 (b) 903.27 cm^3 (c) 1296.5 cm^3 (d) 1156.63 cm^3 (iii) Find the ratio of the volume of sphere to the volume of cylinder. (a) 2:1 (b) 1:2 (c) 1:1 (d) 3: 1	4

ANSWERS:

Q. NO	ANSWER	MARKS
1.	Let the height of cylinder = $2h$ Radius of base = h $\pi \times h^2 \times 2h + \frac{2}{3} \pi \times h^3 = 1408/21$ $h = 2 \text{ cm}$ height of cylinder = 4 m	4
2.	Let the height of the drum be h. Volume of the drum = volume of the cylinder + volume of the sphere $\pi \times 3^2 \times h = (\pi \times 3^2 \times 8 + \frac{4}{3} \pi \times 3^3) \text{ cm}^3 \Rightarrow h = (8 + 4) \text{ cm} \Rightarrow h = 12 \text{ cm}$	4

3.	i) 25cm ii) $550\text{cm}^2, 1232\text{cm}^3$ iii) 1056cm^2	4
4.	i) $V = \text{volume of cylinder} + \text{volume of sphere}$ $= \pi r^2 h + \frac{4}{3} \pi r^3$ $= \pi r^2 (h + \frac{2}{3} r)$ $= 3.14 \times 12.5 \times 12.5 (35 + \frac{2}{3} \times 12.5)$ $= 21260.42\text{cm}^3$ ii) $v \text{ of the box} = lbh = 60 \times 25 \times 25 = 37500\text{cm}^3$	4
5.	Volume of wood used $= 6 \times (7 \times 1 \times 1) = 42\text{ cm}^3$ Surface area to be painted $= 6 [3(7 \times 1) + 1 \times 1 + 6 \times 1] = 168\text{ cm}^2$ Cost of painting $= 0.50 \times 168 = \text{Rs } 84$	4
6.	Area $= 2\pi r h = 2 \times 3.14 \times 45 \times 110 = 31086\text{ cm}^2$ or 3.1086 m^2 (2) Area levelled in 560 revolutions $= \text{Area} \times 560 \text{ revolutions} = 17408160\text{ cm}^2$ or 1740.82 m^2 (1) Cost of levelling $= \text{Total area} \times 5 \text{ per m}^2 = 17408160 \times 5 = 87040800$ or $1740.82 \times 500 = \text{Rs. } 870410$ (1)	4
7.	Radius of the base of cone, $r = 21\text{ cm}$ Let 'h' is the height of cone. Then, Volume of cone $= \frac{2}{3}$ Volume of hemisphere $\Rightarrow \frac{1}{3} \pi r^2 h = \frac{2}{3} \times \frac{2}{3} \pi r^3$ $\Rightarrow h = \frac{4}{3} r$ $\Rightarrow \text{Height of cone, } h = \frac{4}{3} \times 21 = 28\text{ cm}$ $\therefore$ Slant height of cone, $l^2 = h^2 + r^2$, where l is the slant height of cone $= (28)^2 + (21)^2$ $= 784 + 441 = 1225$ $\Rightarrow \therefore l = \sqrt{1225} = 35\text{ cm}$ Surface area of the toy = Curved surface area of cone + Curved surface area of hemisphere $= \pi r l + 2\pi r^2$ $= \frac{22}{7} \times 21 \times 35 + 2 \times \frac{22}{7} \times 21 \times 21$ $= 2310 + 2772 = 5082\text{ cm}^2$ 	4

8.	Given that, Height (h) of the conical part = Height (h) of the cylindrical part = 2.4 cm Diameter of the cylindrical part = 1.4 cm Therefore, radius (r) of the cylindrical part = 0.7 cm Slant height (l) of conical part = $\sqrt{r^2 + h^2}$ $= \sqrt{(0.7)^2 + (2.4)^2} = \sqrt{0.49 + 5.76}$ $= \sqrt{6.25} = 2.5$ Total surface area of the remaining solid will be = CSA of cylindrical part + CSA of conical part + Area of cylindrical base $= 2\pi rh + \pi rl + \pi r^2$ $= 2 \times \frac{22}{7} \times 0.7 \times 2.4 + \frac{22}{7} \times 0.7 \times 2.5 + \frac{22}{7} \times 0.7 \times 0.7$ $= 4.4 \times 2.4 + 2.2 \times 2.5 + 2.2 \times 0.7$ $= 10.56 + 5.50 + 1.54 = 17.60 \text{ cm}^2$ The total surface area of the remaining solid to the nearest cm^2 is 18 cm^2	4
9.	1. The length of the diagonal if each edge measures 6cm = $\sqrt{36 + 36}$ $= \sqrt{2 \times 36} = 6\sqrt{2}$ Ans : (d) 2. Volume of the solid = $7 \times 7 \times 7 \text{ cm}^3 = 343 \text{ cm}^3$ Ans : (c) 3. curved surface area of hemisphere = $2\pi r^2 = 2 \times \frac{22}{7} \times 7 \times 7 \text{ cm}^2 = 308 \text{ cm}^2$ Ans : (b) 4. Slant height of the cone = $\sqrt{24 \times 24 + 7 \times 7} \text{ cm} = \sqrt{576 + 49} \text{ cm}$ $= \sqrt{625} \text{ cm} = 25 \text{ cm}$ The total surface area of cone with hemispherical ice cream = CSA of hemisphere + CSA of cone = $2\pi r^2 + \pi rl = \pi r (2r + l)$ $= \frac{22}{7} \times 7 \times (2 \times 7 + 25) \text{ cm}^2$ $= 22 \times 39 \text{ cm}^2 = 858 \text{ cm}^2$ Ans : (a)	4
10.	1. Curved surface area of the cylinder made by Rahul = $2\pi rh$ $= 2 \times \frac{22}{7} \times 3.5 \times 0.5 \times 12 \text{ cm}^2 = 44 \times 0.25 \times 12 \text{ cm}^2 = 132 \text{ cm}^2$ Ans : (b) 2. The ratio of the curved surface area of the cylinder made by Rahul and Rohit: Curved surface area of the cylinder made by Rohit = $2\pi rh$	4

	$= 2 \times \frac{22}{7} \times 3.5 \times 0.5 \times 8 \text{ cm}^2 = 44 \times 0.25 \times 8 \text{ cm}^2 = 88 \text{ cm}^2$ Required ratio = $\frac{132}{88} = \frac{3}{2} = 3:2$ Ans : (b) 3. The volume of the cylinder made by Rohit = $\pi r^2 h = \frac{22}{7} \times 3.5 \times 3.5 \times 0.5 \times 8 \text{ cm}^3$ $= 22 \times 0.5 \times 3.5 \times 0.5 \times 8 \text{ cm}^3 = 11 \times 14 \text{ cm}^3 = 154 \text{ cm}^3$ Ans : (a) 4. When two coins are shifted from Rahul's cylinder to Rohit's cylinder then: Ans : (c) Volume of Rahul's Cylinder = volume of Rohit's cylinder.	
11.	ANS: Given, pencils are cylindrical in shape. Length of one pencil = 25 cm and circumference of base = 1.5 cm $r = \frac{1.5 \times 7}{22 \times 2} = 0.2386 \text{ cm}$ now CSA of one pencil = $2\pi rh = 2 \times \frac{22}{7} \times 0.2386 \times 25 = 37.49 \text{ cm}^3$ $= (37.49/100) \text{ dm}^3$ Therefore CSA of 1200 pencils = $0.375 \times 12000 = 45000 \text{ dm}^3$ Cost of colouring 1 dm^3 CSA of pencils manufactured in one day = ₹ 0.05 Cost of colouring 45000 dm^3 curved surface = ₹ 2250	4
12.	ANS: Given, length of the pond = 50 m and width of the pond = 44 m Depth required of water = 21 cm = $(21/100) \text{ m}$ Volume of water in the pond = $[50 \times 44 \times (21/100)]^3 = 462 \text{ m}^3$ Also given radius of pipe = 7 cm = $(7/100) \text{ m}$ And speed of water flow in 1h = $\pi R^2 H = [(\frac{22}{7}) \times (\frac{7}{100}) \times (\frac{7}{100}) \times 1500] = 231 \text{ m}^3$  Since 231 m^3 of water falls in the pond in 1 h. So 1 m^3 water falls in the pond in $(1/231) \text{ h}$. Also 462 m^3 of water falls in the pond in $[(1/231) \times 462] \text{ h} = 2 \text{ h}$. Hence, the required time is 2 h.	4
13.	i) d) 404.25 cm^3 ii) b) 89.83 cm^3 iii) cylindrical glass, 314.42 cm^3	1+1+2=4
14.	i) Area of four walls = $2(l + b) \times h = 2(8 + 4.5) \times 2.8 = 70 \text{ sq. cm}$ ii) Area of semi circular ventilator = $\frac{1}{2} \pi r^2 = \frac{1}{2} \times \frac{22}{7} \times 0.7 \times 0.7 = 0.77 \text{ sq. m}$ iii) Area of door = $l \times b = 2 \times 1.4 = 2.8 \text{ sq. m}$	1+1+2=4

	Area of two windows = $2 \times (2 \times 1.5) = 6$ sq. M Area to be white-washed = $70 - (2.8 + 0.77 + 6) = 60.43$ sq. M Cost of white washing = $\text{Rs } 10 \times 60.43 = \text{Rs } 604.30$	
15.	(i)a (ii)b (iii)b (iv)c	4
16.	(i)d, length of the diagonal = $\sqrt{3} \times \text{side} = \sqrt{3} \times 6 = 6\sqrt{3}$ (ii)c, Volume of cube = $(\text{side})^3 = (7)^3 = 343 \text{ cm}^3$ (iii)b, CSA of hemisphere = $2 \pi r^2 = 2 \times \frac{22}{7} \times 7 \times 7 = 308 \text{ cm}^2$ (iv)b, Slant height of cone, $l = \sqrt{r^2 + h^2} = \sqrt{7^2 + 24^2} = \sqrt{625} = 25 \text{ cm}$	4
17.	(i) a (ii) a (iii) d	4
18.	(i) d (ii) c (iii) b	4
19.	Volume of type 'A' Volume of cone + Volume of hemisphere $\frac{1}{3} \times \frac{22}{7} \times r^2 h + \frac{2}{3} \times \frac{22}{7} \times r^3 = \frac{22}{7} \times r^2 \left(\frac{h}{3} + \frac{2r}{3} \right)$ $= \frac{22}{7} \times 5 \times 5 \left(\frac{8}{3} + \frac{10}{3} \right)$ $= \frac{22}{7} \times 25 \times \left(\frac{18}{3} \right)$ $= \frac{22}{7} \times 25 \times 6$ $= \frac{3300}{7} = 471.43 \text{ cm}^3$ Volume of type B = volume of cylinder $= \frac{22}{7} \times 5 \times 5 \times 8$ $= \frac{4400}{7} = 628.57 \text{ cm}^3$ (a) $\therefore$ Volume of a cone = 471.43 cm^3 (b) Volume of a cup = 628.57 cm^3 (c) Cup has more capacity.	4
20.	(i) (b) Since, volume of sphere = volume of cylinder $\Rightarrow \frac{4}{3} \pi R^3 = \pi r^2 h$ where R, r are the radii of sphere and cylinder respectively. $\Rightarrow R^3 = \frac{6 \times 6 \times 8 \times 3}{4} = (6)^3 \Rightarrow R = 6 \text{ cm} \Rightarrow R = 6 \text{ cm}$ $\therefore$ Radius of sphere = 6 cm (ii) (a) Volume of sphere = $\frac{4}{3} \pi R^3$ $= \frac{4}{3} \times \frac{22}{7} \times 6 \times 6 \times 6 = 905.14 \text{ cm}^3$ (iii) (c) Volume of sphere = Volume of cylinder $\therefore$ Required ratio = 1 : 1	4

DRAFT