CHAPTER 12 SURFACE AREAS AND VOLUMES

SUBJECT: MATHEMATICS **MAX. MARKS : 40**

CLASS : X **DURATION : 1½ hrs**

General Instructions:

(i). **All** questions are compulsory.

(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.

(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.

(iv). There is no overall choice.

(v). Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. A tank is made of the shape of a cylinder with a hemispherical depression at one end. The height of the cylinder is 1.45 m and radius is 30 cm. The total surface area of the tank is:
(a) 30 m (b) 3.3 m (c) 30.3 m (d) 3300 m

2. A cone, a hemisphere and cylinder are of the same base and of the same height. The ratio of their volumes is
(a) 1 : 2 : 3 (b) 2 : 1 : 3 (c) 3 : 1 : 2 (d) 3 : 2 : 1

3. Volumes of two spheres are in the ratio 64 : 27. The ratio of their surface areas is
(a) 3 : 4 (b) 4 : 3 (c) 9 : 16 (d) 16 : 9

4. The ratio of the total surface area to the lateral surface area of a cylinder with base radius 80 cm and height 20 cm is
(a) 1 : 2 (b) 2 : 1 (c) 3 : 1 (d) 5 : 1

5. The ratio of the volumes of two spheres is 8 : 27. The ratio between their surface areas is
(a) 2 : 3 (b) 4 : 27 (c) 8 : 9 (d) 4 : 9

6. The radius (in cm) of the largest right circular cone that can be cut out from a cube of edge 4.2 cm is
(a) 4.2 (b) 2.1 (c) 8.1 (d) 1.05

7. A cube whose edge is 20 cm long, has circles on each of its faces painted black. What is the total area of the unpainted surface of the cube if the circles are of the largest possible areas?
(a) 90.72 cm^2 (b) 256.72 cm^2 (c) 330.3 cm^2 (d) 514.28 cm^2

8. The radii of 2 cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 3. Then, the ratio of their volumes is:
(a) 19 : 20 (b) 20 : 27 (c) 18:25 (d) 17:23

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

9. **Assertion (A):** Total surface area of the cylinder having radius of the base 14 cm and height 30 cm is 3872 cm^2.
Reason (R): If r be the radius and h be the height of the cylinder, then total surface area = $(2\pi rh + 2\pi r^2)$.

10. **Assertion (A):** If the height of a cone is 24 cm and diameter of the base is 14 cm, then the slant height of the cone is 15 cm.
Reason (R): If r be the radius and h the slant height of the cone, then slant height = $\sqrt{(h^2 + r^2)}$

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. Find the volume of the largest right circular cone that can be cut out of a cube whose edge is 9 cm? [Use $\pi = 22/7$]

12. Two cubes each of side 4 cm are joined end to end. Find the surface area of the resulting cuboid.

13. A solid is in the shape of a cone mounted on a hemisphere of same base radius. If the curved surface areas of the hemispherical part and the conical part are equal, then find the ratio of the radius and the height of the conical part.

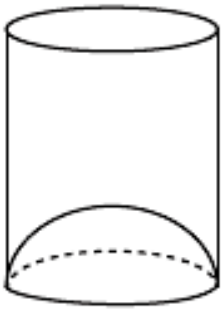
14. A solid cube is cut into two cuboids of equal volumes. Find the ratio of the total surface area of the given cube and that of one of the cuboids.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. 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. [Use $\pi = \frac{22}{7}$]

16. A juice seller serves his customers using a glass as shown in figure. The inner diameter of the cylindrical glass is 5 cm, but the bottom of the glass has a hemispherical portion raised which reduces the capacity of the glass. If the height of the glass is 10 cm, find the apparent capacity of the glass and its actual capacity. [$\pi = 3.14$]



17. From a solid cylinder whose height is 15 cm and diameter 16 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid. [Take $\pi = 3.14$]

SECTION – D

Questions 18 carry 5 marks.

18. A rectangular metal block has length 15 cm, breadth 10 cm and height 5 cm. From this block, a circular hole of diameter 7 cm is drilled out. Find: (i) the volume of the remaining solid (ii) the surface area of the remaining solid.

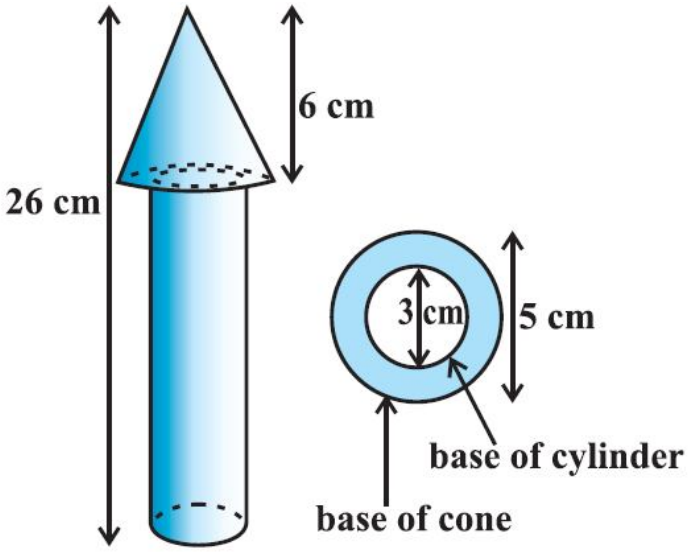
OR

Due to heavy floods in a state, thousands were rendered homeless. 50 schools collectively decided to provide place and the canvas for 1500 tents and share the whole expenditure equally. The lower part of each tent is cylindrical with base radius 2.8 m and height 3.5 m and the upper part is conical with the same base radius, but of height 2.1 m. If the canvas used to make the tents costs ₹120 per m^2, find the amount shared by each school to set up the tents.

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. In a toys manufacturing company, wooden parts are assembled and painted to prepare a toy. One specific toy is in the shape of a cone mounted on a cylinder. For the wood processing activity center, the wood is taken out of storage to be sawed, after which it undergoes rough polishing, then is cut, drilled and has holes punched in it. It is then fine polished using sandpaper. For the retail packaging and delivery activity center, the polished wood sub-parts are assembled together, then decorated using paint. The total height of the toy is 26 cm and the height of its conical part is 6 cm. The diameters of the base of the conical part is 5 cm and that of the cylindrical part is 3 cm. On the basis of the above information, answer the following questions:



(a) If its cylindrical part is to be painted yellow, find the surface area need to be painted. [1]

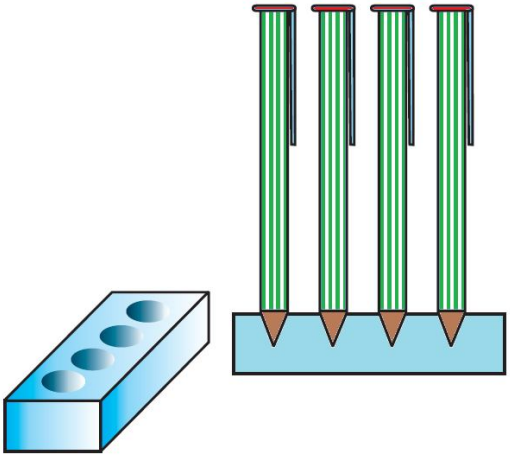
(b) If its conical part is to be painted green, find the surface area need to be painted. [2]

OR

(b) Find the volume of the wood used in making this toy. [2]

(c) If the cost of painting the toy is 3 paise per sq cm, then find the cost of painting the toy. (Use π = 3.14) [1]

20. A pen stand made of wood is in the shape of a cuboid with four conical depressions to hold pens. The dimensions of the cuboid are 15 cm by 10 cm by 3.5 cm. The radius of each of the depressions is 0.5 cm and the depth is 1.4 cm.



Based on the above information, answer the following questions.

(i) Find the volume of four conical depressions in the entire stand [2]

(ii) Find the volume of wood in the entire stand [2]

OR

(ii) Three cubes each of side 15 cm are joined end to end. Find the total surface area of the resulting cuboid. [2]