Mensuration Solution

1. Answer: (D)

Let diameter of base be 2x cm & height of cylinder be 3x cm

$\therefore$ radius = $\frac{2x}{2} = x\ cm$

We know,

Volume of cylinder

$= \pi r^2 h\ (r \rightarrow radius, h \rightarrow height)$

ATQ,

$\pi r^2 h = 3234$

$\frac{22}{7} \times x^2 \times 3x = 3234$

$x = 7cm$

Radius = 7cm

2. Answer: (E)

Let thickness of each disc be 'x' cm

ATQ,

$616 = \frac{22}{7} \times 3.5^2 \times x \times 8$

$\Rightarrow x$ = 2cm

3. Answer: (D)

Radius of sphere = radius of semicircle

Surface area of sphere = $4\pi(radius)^2$

$(radius\ of\ sphere)^2 = \frac{616 \times 7}{4 \times 22} = 49$

$(radius\ of\ sphere) = 7cm$

Height of cylinder = 7 × 2.5 = 17.5 cm

Radius of cylinder = $\frac{17.5}{5} = 3.5cm$

4. Answer: (D)

Value of embankment formed

= Volume of soil taken out

Let 'h' is height of embankment

$\pi \times 8^2 \times 9 = \pi \times (12^2 - 8^2) \times h$

$\frac{64 \times 9}{20 \times 4} = h \Rightarrow$ h = 7.2 m

5. Answer: (A)

Required % increase = $12 + 17 + \frac{12 \times 17}{100}$

= 29 + 2.04 = 31.04%

6. Answer: (B)

Let diameter be 4x

& height be 5x

New diameter = 6x

New radius = 3x

$2\pi Rh - 2\pi rh = 160\pi$

$15x^2 - 10x^2 = 80$

$5x^2 = 80$

$x^2 = 16$

x = 4

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

$\pi \times 8 \times 8 \times 20 = 1280\ \pi$

7. Answer: (A)

Let d = 4x and h = 3x

Total surface area of right circular

Cylinder is $2\pi r\ (r + h)$

$\begin{bmatrix} Where\ is\ r \rightarrow radius \\ h \rightarrow height \end{bmatrix}$

$\therefore 2\pi \left[2x(2x + 3x) - \frac{3x}{2}\left(\frac{3x}{2} + 3\right)\right] = 318.5\pi$

$2\left[10x^2 - 6.75x^2\right] = 318.5$

$6.5x^2 = 318.5$

$x^2 = 49$

$x = \pm 7$

$\therefore radius\ (r) = 14$

height (h) = 21

$\therefore$ circumference of base of cylinder = $2\pi r$

$= 282\pi cm^2$

8. Answer: (C)

Let height of cylinder be h cm and radius be r cm

$\pi r^2 h = 500\pi$

h = 5 cm = diagonal of square

side of square = $\frac{5}{\sqrt{2}} cm$

perimeter of square = $4 \times \frac{5}{\sqrt{2}} = 10\sqrt{2}\ cm$

9. Answer: (A)

Side of square = $\sqrt{64} = 8\ cm$

Diagonal of square = $8\sqrt{2}cm$

Required volume = $\frac{22}{7} \times 7 \times 7 \times 8\sqrt{2}$

$= 1232\sqrt{2}cm^2$

10. Answer: (B)

$\frac{d}{h} = \frac{7}{3}$

$\therefore \frac{R}{h} = \frac{7}{6}$

$\Rightarrow h = \frac{6R}{7}$ ……..(i)

According to condition & from (i)

$\frac{2\pi R\left(\frac{6}{7}R\right)}{\pi R^2\left(\frac{6}{7}R\right)} = \frac{2}{21} \Rightarrow$ R = 21

11. Answer: (D)

$\frac{2\pi rh}{\pi r^2 h} = \frac{4}{7}$

Or, $\frac{2}{r} = \frac{4}{7}$

Or, r = $\frac{7}{2}$

Also, $\frac{2r}{h} = \frac{14}{5} \Rightarrow h = \frac{5}{2}$

Total surface area = $2 \times \frac{22}{7} \times \frac{7}{2}\left(\frac{7}{2} + \frac{5}{2}\right)$

$= 22 \times \frac{12}{2} = 132$

12. Answer: (D)

$2\pi rh : \pi r^2 h = 1:7$

$2:r = 1:7$

$\Rightarrow$ r = 14

$\Rightarrow$ Diameter : Height $\Rightarrow$ 2r : h = 4 : 3

$\Rightarrow$ h = 21

Total surface area of cylinder

$= 2 \times \frac{22}{7} \times 14(14 + 21) = 88 \times 35 = 3080$

13. Answer: (E)

Let radius and height of the cylinder 'r' and 'h' respectively.

C.S.A of cylinder = $2\pi rh$

Ratio = $\frac{\pi r^2 h}{2\pi rh} = \frac{7}{2}$

R = 7 units

So, h = 2r = 14 units

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

$= 2 \times \frac{22}{7} \times 7 \times (7 + 14) = 924$ unit^2

14. Answer: (C)

Total surface area of cube = $6a^2$[a $\rightarrow side$]

$6a^2 = 1176$

$a^2 = 196$

a = 14 cm

Height of cylinder (h)

$= 14 \times \frac{150}{100} = 21\ cm$

Radius of cylinder (r) = $\frac{21}{7} \times 3 = 9\ cm$

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

$= 2\pi \times 9(21 + 9) = 540\pi cm^2$

15. Answer: (D)

Let side of square is a m. $a^2 = 400$

$\therefore$ a = 20m

$\therefore diagonal = a\sqrt{2} = 20\sqrt{2}m.$

Radius of cylinder (r) = $\frac{20}{2}\sqrt{2}m$

& height of cylinder (h) = $2 \times \frac{10\sqrt{2}}{5} = 4\sqrt{2}m$

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

$= \pi\left(10\sqrt{2}\right)^2 \times 4\sqrt{2} = 800\sqrt{2}\pi m^3$

16. Answer: (B)

Radius of base of cylinder

$= \frac{66}{2 \times 22} \times 7 = \frac{21}{2} cm$

Volume of cylinder = $\frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \times 4$

= 1386 cm^3

17. Answer: (A)

Radius of cylinder = side of equilateral Δ

$\therefore \frac{\sqrt{3}}{4}a^2 = 16\sqrt{3}, where\ a = sides\ of\ \Delta$

$\therefore a^2 = 64$

$\Rightarrow$ a = 8 cm

And, height of cylinder = 3 × 8 = 24 cm

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

$= \pi \times 8^2 \times 24 = 1536\pi\ cm^3$

18. Answer: (E)

Volume of cylindrical vessel

= 22/7 × 17.5 × 17.5 × 18 = 17325 cm^3

Volume of milk

$= 17325 \times \frac{80}{100} = 13860\ cm^3$

$30 \times 7 \times 3 \times h = 13860$

h = $\frac{462}{21}$

h = 22 cm

19. Answer: (A)

Length + breadth + height = 12 cm

And

$\sqrt{l^2 + b^2 + h^2} = 5\sqrt{2}$

$l^2 + b^2 + h^2$ = 50 cm

l + b + h = 12

Square both sides

$(l + b + h)^2 = 12^2$

$l^2 + b^2 + h2 + 2$ (lb + bh + hl) = 12^2

$12^2 = 50 + 2$ (lb + bh + hl)

2 (lb + bh + hl) = 94 cm^2

20. Answer: (C):

Statement I:
Total Surface Area of cuboid = 2 (lb + bh + hl)
Let length = 2x, breadth = 3x, height = x
$\therefore 550 = 2 (3x \times 2x + 3x \times x + x \times 2x)$
$\Rightarrow 275 = (6x^2 + 2x^2 + 3x^2)$
$\Rightarrow 275 = 11x^2$
$\Rightarrow x^2 = 25$
$\Rightarrow x = 5$
$\therefore$ Length = 10 cm, Breadth = 15 cm, Height = 5 cm
Volume = lbh
$\Rightarrow 10 \times 15 \times 5 = 750\ cm^3$
Statement II:
Total Surface Area of cube = $6s^2$
$\therefore 384 = 6s^2$
$\Rightarrow s^2 = 64$
$\Rightarrow s = 8$ cm
Volume of the cube = s^3
$\Rightarrow 8^3 = 512\ cm^3$
Statement III:
Let height of the cuboid = x cm, length = 2x, breadth = 3x
$\therefore$ Difference of height and length = 2x – x
$\Rightarrow 5 = x$
$\Rightarrow x = 5$
$\therefore$ length = 10 cm, breadth = 15 cm, height = 5 cm
Volume of the cuboid = lbh
$\Rightarrow 10 \times 15 \times 5 = 750\ cm^3$
$\therefore$ Either statement I or III and statement II are required to answer the question.