## MENSURATION



#### (Ref: FM-QAH2022016)

#### **2D MENSURATION**

- A room is half as long again as it is wide. The cost 1. of carpeting it at 62 paise per square metre is Rs. 2916.48. Find the cost of white washing the ceiling at 30 paise per metre : a) Rs. 2211.5 b) Rs. 1114.2
  - c) Rs. 1411.2 d) can't be determined
- If the length of a rectangular field is doubled and its 2. breadth is halved (i.e., reduced by 50%). What is the percentage change in the area? a) 25% b) 0% c) 25% d) 33.33%
- A path of uniform width runs all around the inside of 3. rectangular field 116 m by 68 m and occupies 720 sq. m. Find the width of the path :
  - a) 1 m b) 1.5 m
  - d) 4 m c) 2 m
- 4. The area of a rectangular football field is 24200 sq. m. It is half as broad as it is long. What is the approx minimum distance a man will cover if he wishes to go from one corner to the opposite one? a)

a) 283 m	b) 246 m
c) 576 m	d) 289 m

- If the perimeter of a square and a rectangle are the 5. same, then the areas A and B enclosed by them would satisfy the inequality : a) A> B b) A ≥ B c) A< B d) A ≤ B
- The ratio of the area of a square to that of the 6. square drawn wilts diagonal is : a) 1 : 1 b) 1 : 2
  - c) 1:3 d) 1:4
- 7. The integral base of an isosceles triangle can be whose area is 60 cm<sup>2</sup> and the length of one of the equal sides Is 13 cm : a) 20 cm b) 10 cm

u) 20 0m	b) 10 011
c) 16 cm	<ul> <li>d) data insufficient</li> </ul>

- If the altitude of an equilateral triangle is  $2\sqrt{3}$ , then 8 its area is : a) 4√3 cm<sup>2</sup> b) 12√3 cm<sup>2</sup>
  - d) none of these c) 8/√3 cm<sup>2</sup>
- 9 If the perimeter of a rhombus is 4p and lengths of its diagonals are a and b, then its area is : a) a/b b) ab/2 d) p ( $a^2 + b^2$ ) c) ab/p

- 10. The ratio of the lengths of the diagonal of a rhombus is 2:5. Then, the ratio of the area of the rhombus to the square of the shorter diagonal: a) 5 : 4 b) 5 : 2
  - c) 2 : 5 d) none of these
- 11. The area of a hexagon whose one side is 4 m, is : a) 6√3 m² b) 24√3 m<sup>2</sup> c) 42√3 m<sup>2</sup> d) 24 m<sup>2</sup>
- 12. The area of a trapezium is 441 cm<sup>2</sup> and the ratio of parallel sides is 5:9. Also, the perpendicular distance between them is 21 cm, the length of parallel sides is:
  - b) 27 cm a) 36 cm c) 18 cm d) 28 cm
- 13. A circular wire of radius 4.2 m is cut and bent in the form - of a rectangle whose longer side is 20% more than its shorter side. The longer side of the rectangle is :



- 14. A circle of radius 'a' is divided into 6 equal sectors. An equilateral triangle is drawn on the chord of each sector to lie outside the circle. Area of the resulting figure is:
  - a)  $3a^{2}(\pi + \sqrt{3})$ b) 3√3 a² c)  $3(a^2\sqrt{3} + \pi)$ 
    - d) 3√3πa²/2
- 15. The area of a minor sector subtending the central angle at the centre 40° is 8.25 cm<sup>2</sup>. What is the area of the remaining part (i.e., major sector) of the circle?
  - a) 82.5 cm<sup>2</sup> b) 74.25 cm<sup>2</sup> c) 66 cm<sup>2</sup> d) none of these
- 16. The radius of a circle is equal to the length of one side of an equilateral triangle. If the perimeter of the triangle is 3 cm what is the ratio of the area of the triangle to that of the circle?

a) 
$$\frac{\sqrt{3}}{22}$$
 b)  $\frac{88}{7\sqrt{3}}$  c)  $\frac{7\sqrt{3}}{22}$  d)  $\frac{7\sqrt{3}}{88}$ 

- 17. There are two squares one of whose diagonal is double that of the other. The ratio of area of the bigger one to that of the smaller one is? a) 3:2 b) 4:1 c)1:4 d) 2:1
- 18. The area of a rhombus having one side 10 cm and one diagonal 12 cm is
  - a) 48 cm<sup>2</sup> b) 96 cm<sup>2</sup>
  - c) 144 cm<sup>2</sup> d) 192 cm<sup>2</sup>



- 19. An equilateral triangle and regular hexagon have the same perimeter. The ratio of the area of the triangle to that of the hexagon isa) 3: 2b) 2: 3c) 1: 2d) 1: 4
- 20. A plot of land is in the shape of a right angled isosceles triangle. The length of hypotenuse is  $50\sqrt{2}$ m. The cost of fencing is Rs. 3 per metre. The cost of fencing the plot will be:
  - a) less than Rs. 300
  - b) less than Rs. 400
  - c) more than Rs. 500
  - d) more than Rs. 600
- 21. When the breath of a rectangular plot is increased by four times, its perimeter becomes 480 metres and area 12800 sq m. What was its original breadth (in metre)?
  - a) 160 b) 40 c) 20 d) CND
- 22. The sum of the length and breadth of a rectangle is 6 cm. A square is constructed such that one of its sides is equal to a diagonal of the rectangle. If the ratio of areas of the square and rectangle is 5:2, the area of the square in cm2 is a) 20 b) 10 c)  $4\sqrt{5}$  d)  $10\sqrt{2}$
- 23. In a trapezium ABCD, AB and DC are parallel sides and  $\angle$  ADC = 90°. If AB = 15 cm, CD = 40 cm and diagonal AC = 41 cm. Then the area of the trapezium ABCD is

a) 245 cm <sup>2</sup>	b) 240 cm <sup>2</sup>
c) 247.5 cm <sup>2</sup>	d) 250 cm <sup>2</sup>

24. Two adjacent sides of a parallelogram are of lengths 15 cm and 18 cm. If the distance between two smaller sides is 12 cm, then the distance between two bigger sides is
 a) 8 cm

a) 8 cm	D) 10 CM
c) 12 cm	d) 15 cm

25. A circle inscribed in a square of side 2 has an equilateral triangle inscribed inside it. What is the ratio of areas of the equilateral triangle to that of the square?

a) 9 √3 : 16	b) 3 √3 : 4
c) 9 √3 : 4	d) 3√3 : 16

26. An acute-angled isosceles triangle has two of its sides equal to 10 and 16. Find the area of this triangle.
a) √231 units
b) 12√66 units

a) vzsi units	D $1200$ units
c) 24 units	d) 5√231 units

27. Consider Square S inscribed in circle C, what is ratio of the areas of S and Q? Consider Circle C inscribed in Square S, what is ratio of the areas of S and Q?
a) 2 : π, 4 : π b) 4 : π, 2 : π

c) 1 : π, 4 : π d) 2 : π, 1 : π

- 28. Consider equilateral triangle T inscribed in circle C, what is ratio of the areas of T and C? Consider Circle C inscribed in equilateral triangle T, what is ratio of the areas of T and C?
  - a)  $3\sqrt{3}$ :  $\pi$ ,  $3\sqrt{3}$ : 16  $\pi$
  - b)  $3\sqrt{3}: 4\pi, 3\sqrt{3}: \pi$
  - c)  $\sqrt{3}$  :  $\pi$ ,  $3\sqrt{3}$  :  $4\pi$
  - d)  $\sqrt{3}$  :  $\pi$  ,  $\sqrt{3}$  : 16  $\pi$
- 29. Four identical coins are placed in a square. For each coin the ratio of area to circumference is same as the ratio of circumference to area. Then find the area of the square that is not covered by the coins.



- 30. From a circular sheet of paper with a radius 20 cm, four circles of radius 5cm each are cut out. What is the ratio of the uncut to the cut portion?
  a) 1:3
  b) 4:1
  c) 3:1
  d) 4:3
- 31. There is a square field of side 500 m long each. It has a compound wall along its perimeter. At one of its corners, a triangular area of the field is to be cordoned off by erecting a straight-line fence. The compound wall and the fence will form its borders. If the length of the fence is 100 m, what is the maximum area that can be cordoned off?
  a) 2500 sq. m.
  b) 1250 sq. m.



- 32. The area of the triangle whose vertices are (a, a), (a + 1, a + 1), (a + 2, a) is a)  $a^3$  b) 1 c) 2a d) $2^{1/2}$
- 33.  $\triangle ABC$  and a  $\triangle XYZ$  are equilateral triangles of 54 cm sides. All smaller triangles like  $\triangle ANM$ ,  $\triangle OCP$ ,  $\triangle QPX$ , etc., are also equilateral triangles. Find the area of the shape MNOPQRM.



34. The difference between the area of the circumscribed circle and the area of the inscribed

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circle of an equilateral triangle is 2156 sq cm. What is the area in sq cm of the equilateral triangle? a)  $686\sqrt{3}$  b) 1000

- c) 961√2 d) 650√3
- 35. The perimeter of a right triangle measures 234 m and the hypotenuse measures 97 m. then the other two sides of the triangle are measured as
  - a) 100 m and 37 m
  - b) 72 m and 65 m
  - c) 10 m and 57 m
  - d) None of these
- 36. Three parallel lines are cut by two transversals as shown in the given figure. If AB=2 cm, BC = 4 cm, and DE = 1.5 cm, then the length of EF is



**Direction for questions 37 & 38:** Answer the questions based on the following information.

A cow is tethered at point A by a rope. Neither the rope nor the cow is allowed to enter  $\triangle ABC$ .  $\angle BAC = 30^{\circ}$ AB = AC = 10 m



- 37. What is the area that can be grazed by the cow if the length of the rope is 8 m?
  - a)  $\frac{134\pi}{3}$  sq.m b)  $121\pi$  sq.m c)  $132\pi$  sq.m d)  $\frac{176\pi}{3}$  sq.m
- 38. What is the area that can be grazed by the cow if the length of the rope is 12 m?

a) $\frac{134\pi}{3}$ sq.m	b) 121 $\pi$ sq.m
c) 132 π sq.m	d) $\frac{176\pi}{3}$ sq.m

39. There is a circle of radius 1 cm. Each member of a sequence of regular polygons  $S_1$  (n), n = 4,5,6,...., where n is the number of sides of the polygon, is circumscribing the circle; and each member of the sequece of regular polygons  $S_2$  (n),n 4,5,6.... where n is the number of sides of the polygon, is inscribed in the circle. Let  $L_1$  (n) and  $L_2$  (n) denote the

perimeters of the corresponding polygons of S1 (n)

and S<sub>2</sub> (n). Then  $\frac{[\{L_1(13)+2\pi\}]}{L_2(17)}$ 

- $L_2(17)$
- a) Greater than  $\pi/4$  and less than 1
- b) Greater than 1 and less than 2
- c) Greater than 2
- d) Less than  $\pi/4$
- 40. Consider a square ABCD with midpoints E, F, G, H of AB, BC, CD and DA respectively. Let L denote the line passing through F and H. Consider points P and Q, on L and inside ABCD, such that the angles APD and BQC both equal 120°. What is the ratio of the area of ABQCDP to the remaining area inside ABCD?

a) 
$$\frac{4\sqrt{2}}{3}$$
 b)  $2+\sqrt{3}$   
c)  $\frac{10-3\sqrt{3}}{9}$  d)  $2\sqrt{3}-1$ 

- 41. A square piece of paper is folded three times diagonal to get an isosceles triangle whose equal sides are 10 cm. What is the area of the unfolded on piece of paper?
  - a) 400 sq cm b) 800 sq cm c) 800√2 sq cm d) 1600 sq cm
- 42. A person standing on the ground at point A saw an object at point B on the ground at a distance of 600 meters. The object started flying towards him at an angle of 30° with the ground. The person saw the object for the second time at point C flying at 30° angle with him. At point C, the object changed direction and continued flying upwards. The person saw the object for the third Urns when the object was directly above him. The object was flying at a constant speed of 10 kmph.



Find the angle at which the object was flying after the person saw it for the second time. You may use additional statement(s) if required.

**Statement I:** After changing direction, the object took 3 more minutes than it had taken before.

**Statement II:** After changing direction, the object travelled an additional  $200\sqrt{3}$  meters.

Which of the following is the correct option?

- a) Statement I oboe is sufficient to find the angle but Statement II is not
- b) Statement II alone is sufficient to find the angle but Statement I is not
- c) Statement I and Statement II are consistent with each Other
- d) Statement I and Statement II are inconsistent with each other
- e) Neither Statement I nor Statement II is sufficient to find the angle
- 43. In the diagram below, CD = BF = 10 units and  $\angle CED = \angle BAF = 30^\circ$ . What would be the area of  $\triangle AED$ ?



(Note Diagram below may not be proportional to scale.)



- 44. In quadrilateral PQRS, PQ = 5 units, QR = 17 units RS = 5 units and PS = 9 units. The length of the diagonal QS can be
  a) > 10 and < 12</li>
  b) > 12 and < 14</li>
  - c) > 14 and < 16 d) > 16 and < 18
- 45. Triangle ABC is a right-angled triangle. D and E are mid-points of AB and BC respectively. Read the following statements
  - I. AE = 19
  - II. CD = 22
  - III. Angle B is a right angle.

Which of the following statements would be sufficient to determine the length of AC?

- a) Statement I and II
- b) Statements I and II
- c) Statement II and III
- d) Statement III alone
- e) All three statements
- 46. A rectangular park 60 m long and 40 m wide has two concrete crossroads running in the middle of the park and rest of the park has been used as a lawn. If the area of the lawn is 2109 sq m, then what is the width of the road?
  - a) 2.91 m b) 3 m c) 5.82 m d) None

#### **3D MENSURATION**

- 47. A tank 10 m long and 4 m wide is filled with water. How many litres of water must be drawn off to make the surface sink by 1 m. (1000 L = 1 cubic metre) a) 20 kilolitre b) 40 kilolitre c) 50 kilolitre d) none of these
- 48. How many cubes each of surface area 24 sq. dm can be made out of a metre cube, without any wastage :

a) 75	b) 125
c) 250	d) 62

49. Three cubes of metal, whose edges are 3 cm, 4 cm and 5 cm respectively are melted to form a new cube. What is the surface area of the new cube?
a) 216 cm<sup>2</sup>
b) 56 cm<sup>2</sup>
c) 36 cm<sup>2</sup>
d) none of these

50. The external dimensions of a wooden box closed at both ends are 24 cm, 16 cm and 10 cm respectively weighs thickness of the wood is 5 mm. If the empty box weighs 7.35 kg, find the weight of 1 cubic cm of wood :

a) 10 g	b) 12.5 g
c) 27 g	d) 15 g

- 51. Three equal cubes are placed adjacently in a row.Find the ratio of the total surface area of the resulting cuboid to that of the sum of the total surface areas of the three cubes :
  - a) 5 : 7 b) 7 : 9 c) 9 : 7 d) none of these
- 52. A hollow square shaped tube open at both ends is made of iron. The internal square is of 5 cm side and the length of tube is 8 cm. There are 192 cm<sup>3</sup> of iron in the tube. Find its thickness :
  a) 2 cm
  b) 0.5 cm
  - c) 1 cm d) can't be determined
- 53. The length of longest pole that can be placed on the floor of a room is 12 m and the length of longest pole that can be placed in the room is 15 m. The height of the room is :a) 3 mb) 6 m

### c) 9 m W.TUN d) none of these S.COM

d) none of these

- 54. If the areas of 3 adjacent sides of a cuboid are x, y, z respectively, then the volume of the cuboid is :a) xyzb) xyz
  - c) 3xyz
    - ) SXYZ
- 55. The lateral surface area of a cylinder is 1056 cm<sup>2</sup> and its height is 16 cm. What is its volume?
  a) 5566 cm<sup>3</sup>
  b) 4455 cm<sup>3</sup>
  c) 5544 cm<sup>3</sup>
  d) none of these
- 56. The amount of concrete required to build a cylindrical pillar whose base has a perimeter of 8.8 m and whose curved surface area is 17.6 m<sup>2</sup>.
  a) 12.32 m<sup>3</sup>
  b) 12.23 m<sup>3</sup>
  c) 9.235 m<sup>3</sup>
  d) 8.88 m<sup>3</sup>
- 57. The ratio between curved surface area and total surface area is 2 : 3. It the total surface area be 924 cm<sup>2</sup>, find the volume of the cylinder :
  - a) 2156 cm<sup>3</sup> b) 1256 cm<sup>3</sup> c) 1265 cm<sup>3</sup> d) none of these
- 58. The radius of an iron rod decreased to one-fourth. If its volume remains constant, the length will become :
  - a) 2 times b) 8 times
  - c) 4 times d) 16 times
- 59. The radii of two cylinders are in the ratio of 3 : 5 and their heights are in the ratio 4 : 3. The ratio of their volumes is :a) 12 : 25b) 13 : 25

a) 12 : 25	b) 13 : 2
c) 4 : 5	d) 5 : 4
•) •••	



60. The height of a cone is 30 cm. A small cone is cut off at the top by a plane parallel to the base. If its volume be 1/27 of the volume of the given cone, at what height above the base is the section made?a) 20 cmb) 18 cm

a)	20 011	D)	10	CII
c)	27 cm	d)	15	cm

- 61. The volume and height of a right circular cone are 1232 cm<sup>3</sup> and 24 cm respectively, the area of its curved surface (in cm<sup>2</sup>) is :
  a) 1100 b) 225
  c) 616 d) 550
- 62. How many metres of cloth 10 m wide will be required to make a conical tent with base radius of 14 m and height is 48 m?
  a) 110 m
  b) 77 m
  c) 55 m
  d) 220 m
- 63. The radii of two cones are equal and their slant heights are in the ratio 3 : 2. If the curved surface area of the smaller cone is 300 cm<sup>2</sup>, then the curved surface area of the bigger cone (in cm<sup>2</sup>) is :
  a) 250 b) 450
  c) 150 d) 200
- 64. From a circular sheet of paper of radius 25 cm, a sector area 4% is removed. If the remaining part is used to make a conical surface, then the ratio of the radius and height of the cone is :a) 16 : 25 b) 9 : 25

a) 16 : 25	b) 9 : 25
c) 7 : 12	d) 24 : 7

- A largest possible cone is cut out from a cube of volume 1000 cm<sup>3</sup>. The volume of the cone is :
  a) 280 cm<sup>3</sup>
  b) 261.9 cm<sup>3</sup>
  c) 269.1 cm<sup>3</sup>
  d) 296.1 cm<sup>3</sup>
- 66. A reservoir is in the shape of a frustum of a right circular cone. It is 8 m across at the top and 4 m across at the bottom. It is 6 m deep its capacity is :
  a) 224 m<sup>3</sup>
  b) 176 m<sup>3</sup>
  c) 225 m<sup>3</sup>
  d) none of these
- 67. The radius of a copper sphere is 12 cm. The sphere is melted and drawn into a long wire of uniform circular cross-section. If the length of the wire is 144 cm, the radius of wire is :
  - a) 1 cm b) 2 cm
  - c) 4 cm d) none of these
- 68. A hemispherical bowl of internal radius 6 cm contains alcohol. This alcohol is to be filled into cylindrical shaped small bottles of diameter 6 cm and height 1 cm. How many bottles will be needed to empty the bowl?a) 26 b) 27

a) 36	D) 27
c) 16	d) 4

69. The radii of two cylinders are in the ratio 2:3 and their heights are in the ratio 5:3. The ratio of their volumes is

- a) 27:20 b) 20:2 c) 4:9 d) 9:4
- 70. Three cubes of iron whose edges are 6cm, 8cm and 10cm respectively are melted and formed into a single cube. The edge of the new cube formed is

  a) 12 cm
  b) 14 cm
  c) 16 cm
  d) 18 cm
- 71. The radius of a sphere is 6 cm. It is melted and drawn into a wire of radius 0.2 cm. The length of the wire is
  a) 81 m
  b) 80 m
  c) 75 m
  d) 72 m
- 72. The adius of a wire is decreased to one-third. If volume remains the same, length will increase by
  a) 1.5 times
  b) 3 times
  c) 6 times
  d) 9 times
- 73. The cost of leveling a circular field at 50 Paise per square metre is Rs 7700. The cost (in Rs) of putting up a fence all round it at Rs 1.20 per meter is (Use  $\pi = 22/7$ )
  - a) Rs 132 b) Rs 264 c) Rs 528 d) Rs 1056
- 74. A cone, a hemisphere and a cylinder stand on equal base and have the same height. Their volumes are in the ratio
  - a) 1: 3: 2 b) 2: 3: 1 c) 1: 2: 3 d) 3: 1: 2
- 75. A cylindricl tank of radius 5.6 m and depth of 'h' m is built by digging out earth. The sand taken out is spread all around the tank to form a circular embankment to a width of 7m. What is the depth of the tank if the height of the embankment is 1.97m?
  a) 4.2 m
  b) 7 m
  c) 8 m
  d) 6.7 m
- 76. A right circular cone of height h is cut by a plane parallel to the base and at a distance h/3 from the base, then the volumes of the resulting cone and frustum are in the ratio
  - a) 1 : 3 b) 8 : 19 c) 1 : 4 d) 1 : 7

### Mixed Question

# Directions for questions 77 to 79: Read the information given below and answer the questions that follow:

Consider a cylinder of height h cms and radius  $r = 2/\pi$  cms as shown in the figure (not drawn to scale). A string of a certain length, when wound on its cylindrical surface, starting at point A and ending at point B, gives a maximum of n turns (in other words, the string's length is the minimum length required to wind n turns).

77. What is the vertical spacing in cms between two consecutive turns?





78. The same string, when wound on the exterior four walls of a cube of side *n* cms, starting at point C and ending at point D, can give exactly one turn (see figure, not drawn to scale). The length of the string, in cms, is



79. In the setup of the previous two questions, how is *h* related to *n*?

a) h = √2 i	n	b) h = √17n
c) h = n		d) h = √13 n

- 80. A square tin sheet of side 12 inches is converted into a box with open top in the following steps: The sheet is placed horizontally; Then, equal sized squares, each of side x inches, are cut from the four corners of the sheet; Finally, the four resulting sides are bent vertically upwards in the shape of a box. If x is an integer, then what value of x maximizes the volume of the box?
  a) 3 b) 4 c) 1 d) 2
- 81. The length, breadth and height of a room are in the ratio 3:2:1. If the breadth and height are halved while the length is doubled, then the total area of the four walls of the room will
  - a) remain the same
  - b) decrease by 13.64%
  - c) decrease by 15%
  - d) decrease by 18.75%
  - e) decrease by 30%
- 82. A solid sphere of radius 3 cm is melted to form a hollow right circular cylindrical tube of length 4 cm and external radius 5 cm. The thickness of the tube is

a) 1 cm	b) 9 cm
c) 0.6 cm	d)1.5 cm

83. A right circular cylinder has a radius of 6 and a height of 24. A rectangular solid with a square base and a height of 20, is placed in the cylinder such that each of the corners of the solid is tangent to the cylinder wall. If water is then poured into the cylinder

such that it reaches the rim, then the volume of water is

- a) 288(π-5) b) 288(2π-3) c) 288(3π-5) d) none of these
- 84. A solid sphere is melted and recast into a right circular cone with a base radius equal to the radius of the sphere. What is the ratio of the height and radius of the cone so formed?

a) 4 : 3 b) 2 : 3 c) 3 : 4 d) None

- 85. The radius of a wire is decreased to one-third and its volume remains the same. The new length is how many times the original length?
  - a) 2 times b) 4 times
  - c) 5 times d) 9 times
- 86. In the following figure AB=BC and AC = 84 cm. The radius of the inscribed circle is 14 cm. B is the centre of the largest semi-circle. What is the area of the shaded region?



87. ABCD is a square, 4 equal circles are just touching each other whose centres are the vertices A, B, C, D of the square. What is the ratio of the shaded to the unshaded area within square?



88. ABC is an equilateral triangle and PQRS is a square inscribed in the triangle in such a way that P and Q lie on AB and R, S lie on BC and AC respectively. What is the value of RC:RB?





89. Three circle of equal radii touch each other as shown in figure. The radius of each circle is 1 cm. What is the area of shaded region?



90. ABCDEF is a regular hexagon of side 6 cm. What is



91. What is the height of the cone which is formed by joining the two ends of a sector of circle with radius r and angle 60°?



- 92. If a cube of maximum possible volume is cut off from a solid sphere of diameter d, then the volume of the remaining (waste) material of the sphere would be equal to:
  - a)  $\frac{d^3}{3}\left(\pi \frac{d}{2}\right)$  b)  $\frac{d^3}{3}\left(\frac{\pi}{2} \frac{1}{\sqrt{3}}\right)$ c)  $\frac{d^2}{4}\left(\sqrt{2} - \pi\right)$  d) none of these
- 93. In the adjoining figure ABCD is a square. Four equal semicircle are drawn in such a way that they meet each other at 'O'. Sides AB, BC, CD and AD are the respective diameters of the four semicircles. Each of the side of the square is 8 cm. Find the area of the shaded region:



**Direction for 94 - 95:** A regular hexagon is inscribed in a circle of radius R. Another circle is inscribed in the hexagon. Now another hexagon is inscribed in the second (smaller) circle.



- 94. What is the sum of perimeters of both the hexagons? a)  $(2 + \sqrt{3})R$  b)  $3(2 + \sqrt{3})R$ 
  - d) none of these
- 95. What is the ratio of area of inner circle to the outer circle?
  - a) 3 : 4 b) 9 : 16 c) 3 : 8 d) none of thse

c) 3(3 + √2)R

- 96. If there are some more circle and hexagon inscribed in the similar way as given above, then the ratio of each side of outermost hexagon (largest one) to that of the fourth (smaller one) hexagon is (fourth hexagon means the hexagon which is inside the third hexagon from the outside):
  - a) 9 : 3√2 b) 16 : 9 c) 8 : 3√3 d) none of these
- 97. There are two concentric hexagon. Each of the side of both the hexagons are parallel. Each side of an internal regular hexagon is 8 cm. what is the area of the shaded region, if the distance between corresponding parallel sides is  $2\sqrt{3}$  cm:



- 98. The radius of a cone is √2 times the height of the cone. A cube of maximum possible volume is cut from the same cone. What is the ratio of the volume of the cone to the volume of the cube?
  a) 3.18 π b) 2.25 π
  c) 2.35 π d) can't be determined
- 99. The perimeter of a square, a rhombus and a hexagon are same. The area of square, rhombus and hexagon be s, r, h respectively then which of the following is correct:
  a) r > s > h
  b) s > h > r
  - a) r > s > hc) h > s > rd) data insufficient
- 100. A blacksmith has a rectangular sheet of iron. He has to make a cylindrical vessel both circular ends are closed. When he minimises the wastage of the

sheet of iron, then what is the ratio of the wastage to the utilised area of sheet?

- a) 1/11 b) 2/17
- c) 3/22 d) none of these
- 101. There are six circular rings of iron, kept close to each other. A string binds them as tightly as possible. If the radius of each circular iron ring is 1 cm. what is the minimum possible length of string required to bind them? a)  $2(6 + 3\sqrt{3} + \pi)$  cm
  - b)  $6(2 + \sqrt{3})\pi$  cm
  - c)  $2(6 + \pi)$  cm
  - d) none of these
- 102. An equilateral triangle circumscribes all the six circles, each with radius 1 cm. What is the perimeter of the equilateral triangle?



- a) 6(2+√3) cm
- b) 3(√3+2) cm
- c) 12(√3+4) cm
- d) None of these

a)  $\frac{a}{b}$ 

Answer Key

103. In a right angle triangle ABC, what is the maximum possible area of a square that can be inscribed when one of its vertices coincide with the vertex of right angle of the triangle?



c)  $\frac{a+b}{ab}$ 



104. In the adjoining figure a square of maximum possible area is circumscribed by the right angle triangle ABC in such a way that one of its side just lies on the hypotenuse of the triangle. What is the area of the square?



105. In the adjoining figure a quadrant (of circle inscribes a square of maximum possible area. If the radius of the circle be 'r' then what is the area of the square?



- 106. Area of a regular hexagon and a regular octagon is same which one of the two has larger perimeter?
  - a) Hexagon
  - b) Octagon
  - c) Can't be determined
  - d) None of these

#### 1. B 2. В 3. 4. В 5. В 6. В 7. D 8. А 9. В 10. B А 11. B 12. B 13. A 14. B 15. B 16. D 17. B 18. B 19. B 20. C 21. D 22. A 23. C 24. B 25. D 26. D 27. A 28. B 29. C 30. C 31. A 32. B 33. B 34. A 35. B 36. B 37. D 38. C 39. C 40. D 41. A 42. D 43. D 44. B 45. E 46. B 47. B 48. B 49. A 50. A 51. B 55. C 60. A 52. A 53. C 54. D 56. A 57. A 58. D 59. A 69. B 61. D 62. A 64. D 65. B 66. B 67. C 68. C 70. A 63. B 71. D 72. D 74. C 75. C 76. B 77. B 78. B 79. C 80. D 73. C 81. E 82. A 83. C 84. D 85. D 86. B 87. B 88. C 89. A 90. B 92. B 94. B 96. C 97. A 98. C 99. C 100. A 91. A 93. A 95. A 101. C 102. A 103. D 104. A 105. A 106. A