

CCE MODEL TEST PAPER 3

SECOND TERM (SA-II)

MATHEMATICS

(With Answers)

CLASS X

Time Allowed: 3 Hours

Maximum Marks: 80

General Instructions :

- All questions are compulsory.
- The question paper consists of 34 questions divided into four sections A, B, C and D. Section A comprises of 10 questions of 1 mark each, Section B comprises of 8 questions of 2 marks each, Section C comprises of 10 questions of 3 marks each and Section D comprises of 6 questions of 4 marks each.
- Question numbers 1 to 10 in Section A are multiple choice questions where you are to select one correct option out of the given four.
- There is no overall choice. However, internal choice has been provided in 1 question of two marks, 3 questions of three marks each and 2 questions of four marks each. You have to attempt only one of the alternatives in all such questions.
- Use of calculators is not permitted.

Section 'A'

Question numbers 1 to 10 are of one mark each.

1. Which term of the sequence $-1, 3, 7, 11, \dots$ is 95 ?

- (a) 25th term (b) 24th term
(c) 22nd term (d) 23rd term

2. If α and β are the roots of the equation $x^2 + 4x + 5 = 0$, then the equation whose roots are $(\alpha + 1)$ and $(\beta + 1)$ is

- (a) $x^2 + 2x + 2 = 0$ (b) $x^2 - 2x + 2 = 0$
(c) $x^2 - 2x - 2 = 0$ (d) $x^2 + 2x - 2 = 0$

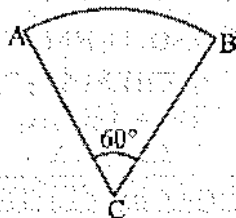
3. If three coins are tossed simultaneously, then the probability of getting at least two heads, is

- (a) $\frac{1}{4}$ (b) $\frac{3}{8}$
(c) $\frac{1}{2}$ (d) $\frac{1}{4}$

4. A cylinder and a cone are of same base radius and of same height. The ratio of the volume of cylinder to that of cone is

- (a) 1 : 3 (b) 3 : 1
(c) 1 : 2 (d) 2 : 1

5. If the following figure is a sector of a circle of radius 10.5 cm, then the perimeter of the sector is



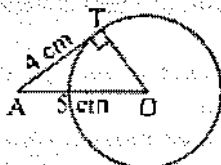
(a) 30 cm

(c) 28 cm

(b) 32 cm

(d) 34 cm

6. The length of tangent from a point A at a distance of 5 cm from the centre of the circle is 4 cm, then the radius of the circle is



(a) 2 cm

(c) 3 cm

(b) 4 cm

(d) 5 cm

7. The string of a kite is 100 metres long and it makes an angle of 60° with horizontal, assuming that there is no slack in the string. The height of the kite is



(a) $\frac{50}{\sqrt{3}}$ m

(c) 100 m

(b) $50\sqrt{3}$ m

(d) $100\sqrt{3}$ m

8. If radii of the two concentric circles are 3 cm and 5 cm, then the length of each chord of one circle which is tangent to other is

(a) 4 cm

(c) 10 cm

(b) 8 cm

(d) 12 cm

9. Two tangents making an angle of 120° with each other, are drawn to a circle of radius 9 cm, then the length of each tangent is equal to

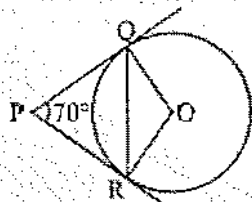
(a) $3\sqrt{3}$ cm

(c) $\sqrt{3}$ cm

(b) $6\sqrt{3}$ cm

(d) $2\sqrt{3}$ cm

10. In figure, PQ and PR are tangents to the circle with centre O such that $\angle QPR = 70^\circ$, then $\angle OQR$ is equal to



- (a) 25°
(c) 45°

- (b) 55°
(d) 35°

Section 'B'

Question numbers 11 to 18 carry 2 marks each.

11. Find the roots of the following equation :

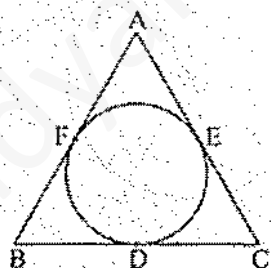
$$\frac{1}{x+3} - \frac{1}{x-8} = \frac{11}{30}; x \neq -3, 8$$

12. A bag contains 6 red balls, 5 white balls, 3 green balls and 6 black balls. One ball is drawn at random from the bag. Find the probability that the ball is :

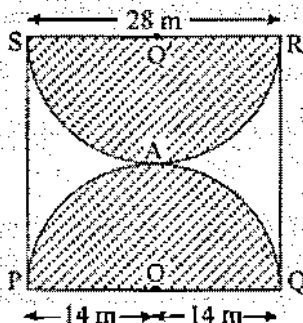
- (i) red or black (ii) not green.

13. If $A(-14, 6)$, $B(2, -2)$ and $C(2, 5)$ are the vertices of a triangle ABC , find the length of the median through A .

14. The incircle of $\triangle ABC$ touches the sides BC , CA and AB at D , E and F respectively. If $AB = AC$, prove that $BD = CD$.

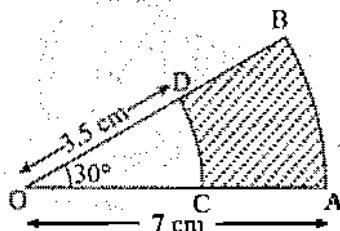


15. $PQRS$ is a square land of side 28 m. Two semicircular grass covered portions are to be made on two of its opposite sides as shown in figure. How much area will be left uncovered? [Take $\pi = \frac{22}{7}$]



Or

In the figure, sectors of two concentric circles of radii 7 cm and 3.5 cm are given. Find the area of the shaded region.



16. Determine the ratio of the volume of a cube to that of a sphere which will exactly fit inside the cube.
17. Find the area of the quadrilateral whose vertices are $A(0, 0)$, $B(6, 0)$, $C(4, 3)$ and $D(0, 3)$.
18. Find the sum of all two digit natural numbers which when divided by 3 yields 1 as remainder.

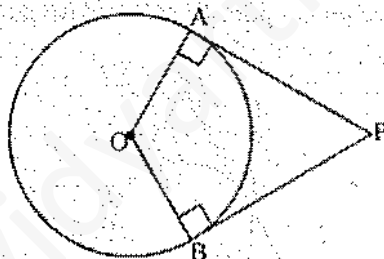
Section 'C'

Question numbers 19 to 28 carry 3 marks each.

19. Two dice are thrown simultaneously. What is the probability that

- (i) 5 will not come up on either of them ?
- (ii) 5 will come on at least one die ?
- (iii) 5 will come on both dice ?

20. In figure, OP is equal to diameter of the circle. Prove that ABP is an equilateral triangle.



21. Solve for x :

$$2\left(\frac{2x-1}{x+3}\right) - 3\left(\frac{x+3}{2x-1}\right) = 5, \text{ given that } x \neq -3, x \neq \frac{1}{2}$$

Or

22. The numerator of a fraction is one less than its denominator. If three is added to each of the numerator and denominator, then fraction is increased by $\frac{3}{28}$. Find the fraction.

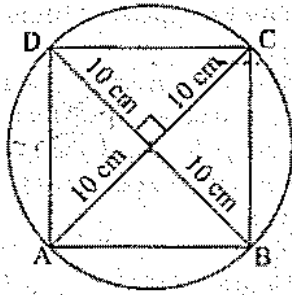
22. If C is a point lying on the line segment AB joining $A(1, 1)$ and $B(2, -3)$ such that $3AC = CB$, then find the coordinates of C .

Or

Find a relation between x and y if the points (x, y) , $(1, 2)$ and $(7, 0)$ are collinear.

23. Draw a circle of radius 4 cm. From a point P , 7 cm from the centre of the circle, draw a pair of tangents to the circle. Measure the length of each tangent segment.

24. A square $ABCD$ is inscribed in a circle of radius 10 cm. Find the area of the circle not included in the square. [Take $\pi = 3.14$]



25. A tower is 50 m high. Its shadow is x m shorter when the Sun's altitude is 45° than when it is 30° . Find x correct to the nearest cm.
26. The sum of n terms of an A.P. whose first term is 5 and common difference is 36 is equal to the sum of $2n$ terms of another A.P. whose first term is 36 and common difference is 5. Find n .

Or

Show that the sum of an A.P. whose first term is a , the second term b and the last term c , is equal to

$$\frac{(a+c)(b+c-2a)}{2(b-a)}$$

27. A glass cylinder with diameter 20 cm has water to a height of 9 cm. A metal cube of 8 cm edge is immersed in it completely. Calculate the height by which water will rise in the cylinder.
28. The coordinates of the centroid of a triangle are $(1, 3)$ and two of its vertices are $(-7, 6)$ and $(8, 5)$. Find the third vertex. Also, find the coordinates of the centroid of the triangle when the third vertex is $(2, 4)$.

Section 'D'

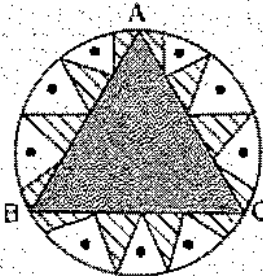
Question numbers 29 to 34 carry 4 marks each.

29. From the top of a building 100 m high, the angles of depression of the top and bottom of a tower are observed to be 45° and 60° respectively. Find the height of the tower. Also find the distance between the foot of the building and the bottom of the tower.

Or

There are two poles, one each on either bank of a river, just opposite to each other. One pole is 60 m high. From the top of this pole, the angles of depression of the top and the foot of the other pole are 30° and 60° , respectively. Find the width of the river and the height of other pole.

30. In a circular table cover of radius 32 cm, a design is formed leaving an equilateral triangle ABC in the middle as shown in figure. Find the area of the design (shaded region).



Or

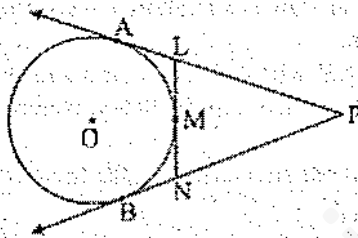
A solid right circular cone of diameter 14 cm and height 4 cm is melted to form a hollow hemisphere. If the external diameter of the hemisphere is 10 cm, find its internal diameter. Also, find the total curved surface area of the hemisphere. [Use $\pi = 3.14$]

31. A contract on construction job specifies a penalty for delay of completion beyond a certain date as follows: ₹ 200 for first day, ₹ 250 for second day, ₹ 300 for third day and so on. If the contractor pays ₹ 27,750 as penalty, find the number of days for which the construction work is delayed.

32. Prove that the lengths of tangents from an external point P to a circle are equal.

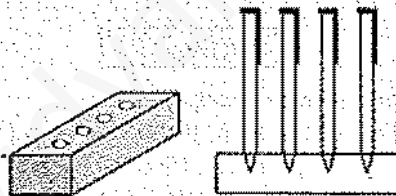
Using the above prove the following :

In figure, PA and PB are tangents from an external point P to a circle with centre O . LN touches the circle at M . Prove that $PL + LM = PN + MN$.



33. Some students planned a picnic. The total budget for food was ₹ 2,000. But 5 students failed to attend the picnic and thus the cost of food for each member increased by ₹ 20. How many students attended the picnic and how much each student pay for the food ?

34. 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. Find the volume of wood in the entire stand.



ANSWERS

Section 'A'

- | | | |
|---------|--------|--------|
| 1. (a) | 2. (d) | 3. (c) |
| 4. (b) | 5. (b) | 6. (c) |
| 7. (b) | 8. (b) | 9. (a) |
| 10. (d) | | |

Section 'B'

11. $x = 2$ or $x = 3$
12. (i) $\frac{12}{25}$ (ii) $\frac{17}{25}$
13. Length of the median through A = $\frac{\sqrt{337}}{2}$

15. 168 m^2 Or 9.625 cm^2

16. $6 : \pi$

17. 15 sq. units

18. 1605

Section 'C'

19. (i) $\frac{25}{36}$ (ii) $\frac{11}{36}$ (iii) $\frac{1}{36}$

21. $x = -10$ or $x = -\frac{1}{5}$ Or $\frac{3}{4}$

22. $\left(\frac{5}{4}, 0\right)$ Or $x + 3y = 7$

23. 5.75 cm

24. 114 cm^2

25. 36 m 60 cm

26. $n = 10$

27. 1.6 cm

28. $(2, -2); (1, 5)$

Section 'D'

29. Distance between the foot of the building and the bottom of tower is 57.73 m and height of the tower = 42.27 m Or Width of the river = $20\sqrt{3}$ m and height of the other pole = 40 m

30. $\left(\frac{22528}{7} - 768\sqrt{3}\right) \text{ cm}^2$ Or 6 cm, 263.76 cm^2

31. 30 days

33. Students attended the picnic = 25, and each student paid for the food = ₹ 80

34. 523.53 cm^3