CCE MODEL TEST PAPER 4

SECOND TERM (SA-II)
MATHEMATICS
(With Answers)
CLASS X

Time Allowed : 3 Hours]   *[Maximum Marks : 80*

General Instructions :

  (i) *All questions are compulsory.*

  (ii) *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.*

  (iii) *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.*

  (iv) *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.*

  (v) *Use of calculators is not permitted.*

Section 'A'

Question numbers 1 to 10 are of one mark each.

1. The sum of all natural numbers from 1 to 100 is :

(a) 4050   (b) 5050

(c) 6050   (d) 7050

2. The values of k for which the difference between the roots of the equation $x^2 + kx + 3 = 0$ is 2, are

(a) ± 4 (b) ± 3

(c) ± 5 (d) ± 6

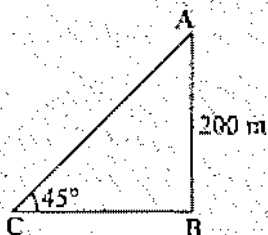**3.** The probability of getting a number between 1 and 100 which is divisible by 7 is

(a) $\dfrac{29}{98}$ (b) $\dfrac{1}{7}$

(c) $\dfrac{25}{98}$ (d) $\dfrac{23}{98}$

4. If the surface areas of two spheres are in the ratio 9 : 16, then   f their radii is

(a) 3 : 4   (b) 4 : 3

(c) 2 : 3   (d) 3 : 2

(300)

**5.** The height of a tower is 200 m. When the angle of elevation of the sun is 45°, then the shadow of the tower is

    (*a*) 100 m   (*b*) 200 m

    (*c*) 150 m   (*d*) 50 m

6. If radii of the two concentric circles are 15 cm and 17 cm, then the length of each chord of one circle which is tangent to other is

    (*a*) 8 cm   (*b*) 16 cm

    (*c*) 30 cm   (*d*) 17 cm

7. In figure, PQ and PR are tangents to the circle with centre O such that $\angle QPR = 50°$, then $\angle OQR$ is equal to
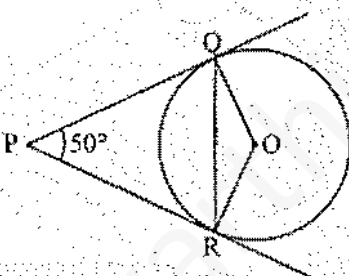
    (*a*) 25°   (*b*) 30°

    (*c*) 40°   (*d*) 50°

8. Two tangents making an angle of 120° with each other, are drawn to a circle of radius 6 cm, then the length of each tangent is equal to

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

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

9. To draw a pair of tangents to a circle which are inclined to each other at an angle of 100°, it is required to draw tangents at end points of those two radii of the circle, the angle between which should be

    (*a*) 100°   (*b*) 50°

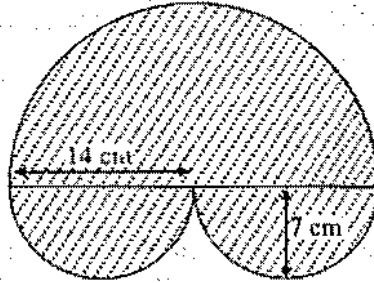   (*c*) 80°   (*d*) 200°

10. The height of a cone is 60 cm. A small cone is cut off at the top by a plane parallel to the base and its volume is $\frac{1}{64}$th the volume of original cone. The height from the base at which the section is made is

    (*a*) 15 cm   (*b*) 30 cm
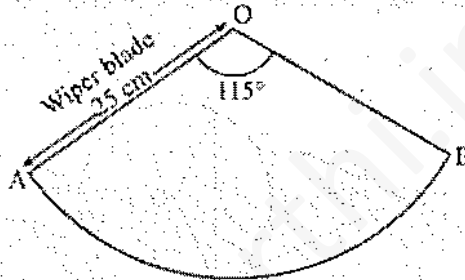
    (*c*) 45 cm   (*d*) 20 cm

*Question numbers 11 to 18 carry 2 marks each.*

11. Find the area of the shaded region in the figure given :

12. A car has two wipers which do not overlap. Each wiper has a blade of length 25 cm sweeping through an angle of 115°. Find the total area cleaned at each sweep of the blades.

13. *PA* and *PB* are two tangents from *P* to the circle with centre *O*. At point *M*, a tangent is drawn cutting *PA* at *K* and *PB* at *N*. Prove that $KN = AK + BN$.
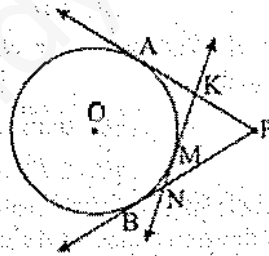
14. Find the nature of roots of the quadratic equation $\sqrt{2}x^2 - \dfrac{3}{\sqrt{2}}x + \dfrac{1}{\sqrt{2}} = 0$.

Or

If the equation $(1 + m^2) x^2 + 2mcx + (c^2 - a^2) = 0$ has equal roots, prove that $c^2 = a^2 (1 + m^2)$.

15. For what value of '*k*', the points $A(k, 11)$, $B(1, 5)$ and $C(-1, 1)$ are collinear ?

16. All cards of ace, jack and queen are removed from a deck of playing cards. One card is drawn at random from the remaining cards, find the probability that the card drawn is

    (*a*) a face card

    (*b*) not a face card.

**17.** Show that the point $P(-4, 2)$ lies on the line segment joining the points $A(-4, 6)$ and $B(-4, -6)$.

18. The 7th term of an A.P. is 32 and its 13th term is 62. Find the A.P.

Section 'C'

Question numbers 19 to 28 carry 3 marks each.

19. Construct a triangle similar to a given isosceles triangle PQR, with $QR = 6$ cm, $PR = PQ = 5$ cm such that each of its sides is $\dfrac{6}{7}$ of the corresponding sides of the $\triangle PQR$.

20. In figure, ABC is a right triangle right-angled at B such that $BC = 6$ cm and $AB = 8$ cm. Find the radius of its incircle.
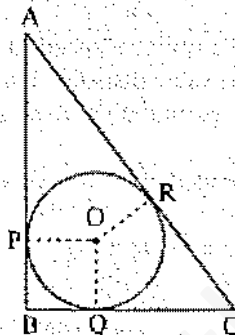
21. Find the number of coins 1.5 cm in diameter and 0.2 cm thick, to be melted to form a right circular cylinder of height 10 cm and diameter 4.5 cm.

Or

Three horses are tethered at 3 corners of a triangular plot having sides 20 m, 30 m and 40 m with ropes 7 m length each. Find the area of the plot which can be grazed by the horses. $\left[\text{Take } \pi = \dfrac{22}{7}\right]$

22. A cylindrical tub of radius 12 cm contains water to a depth of 20 cm. A spherical ball of radius 9 cm is dropped into the tub and thus the level of water is raised by h cm. What is the value of h ?

23. A tree 12 m high, is broken by the wind in such a way that its top touches the ground and makes an angle $60°$ with the ground. At what height from the bottom the tree is broken by the wind ?

24. Prove that four points whose coordinates are $(0, 5)$, $(-2, -2)$, $(5, 0)$ and $(7, 7)$ form a rhombus.

25. A box contains 20 balls numbered 1, 2, 3, 4, ..., 20. A ball is drawn at random from the box. What is the probability that the number on the ball is

    (i) an odd number ?

    (ii) divisible by 2 or 3 ?

26. Find the sum of all natural numbers between 100 and 200 which are divisible by 4.

Or

Which term of the A.P. 3, 10, 17, ... will be 84 more than its 13th term ?

27. The length of the hypotenuse of a right-angled triangle exceeds the base by 1 cm and also exceeds twice the length of the altitude by 3 cm. Find the length of each side of the triangle.

Or

300 apples are distributed equally among a certain number of students. Had there be 10 more students, each would have received one apple less. Find the number of students.

28. Find the area of the triangle formed by joining the mid-points of the sides of the triangle whose vertices are (0, – 1), (2, 1) and (0, 3). Find the ratio of this area to the area of the given triangle.

Section 'D'

Question numbers 29 to 34 carry 4 marks each.

29. Solve for x :

$$\frac{x-1}{x-2} + \frac{x-3}{x-4} = \frac{10}{3} ; (x \neq 2, x \neq 4)$$

Or

A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken 3 hours more to cover the same distance. Find the speed of the train.
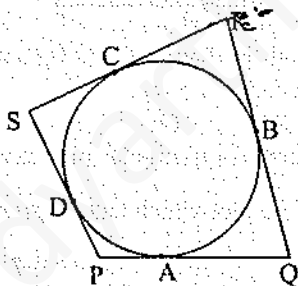
30. A woman takes up a job of ₹ 8000 per month with an annual increment of ₹100. What will she earn over a period of 10 years ?

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

Using the above theorem prove that :

If quadrilateral *PQRS* is circumscribing a circle, then

$$PQ + RS = PS + QR$$

32. A man standing on the deck of a ship, which is 10 m above the water level, observes the angle of elevation of the top of a hill as 60° and angle of depression of the base of the hill as 30°. Find the distance of the hill from the ship and height of the hill.

33. A container, open at the top and made of metal sheet, is in the form of a frustum of a cone of height 24 cm with radius as 7 cm and 14 cm respectively. Find the cost of milk which can completely fill the container at the rate of ₹ 25 per litre. Also find the area of the metal sheet used to make the container.

$$\left[\text{Take } \pi = \frac{22}{7} \right]$$

Or

A bucket is in the form of a frustum of a cone holds 28.49 litres of milk. The radii of the top and bottom are 28 cm and 21 cm respectively. Find the height of the bucket.

34. From a solid cylinder whose height is 24 cm and diameter 14 cm, a conical cavity of the same height and same diameter is hollowed out. Find the volume and total surface area of the remaining solid.

ANSWERS

Section 'A'

1. (b)   2. (a)   3. (b)

4. (a)   5. (b)   6. (b)

7. (a)   8. (d)   9. (c)

10. (c)

Section 'B'

11. 462 cm^2 12. 1254.96 cm^2 14. Roots are real and distinct.

15. $k = 4$ 16. (a) $\dfrac{1}{10}$; (b) $\dfrac{9}{10}$

18. 2, 7, 12, 17, ...

Section 'C'

20. Radius of incircle = 2 cm

21. Number of coins = 450   *Or* 77 m^2 22. $h = 6.75 \text{ cm}$

23. 5.569 m   25. (i) $\dfrac{1}{2}$ (ii) $\dfrac{13}{20}$ 26. 3600   *Or*   25th term

27. Breadth = 12 cm, Hypotenuse = 13 cm, Altitude = 5 cm   *Or*   50

28. 1 : 4

Section 'D'

29. $x = 5$ or $x = \dfrac{5}{2}$ *Or*   Speed of the train = 40 km/h   30. ₹ 10,14,000

32. Distance of the hill from the ship = 17.32 m and height of the hill = 40 m

33. ₹ 215.60; 2266 cm^2 *Or*   15 cm

34. 2464 cm^3; 1232 cm^2