CHAPTER 11 AREAS RELATED TO CIRCLES

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.

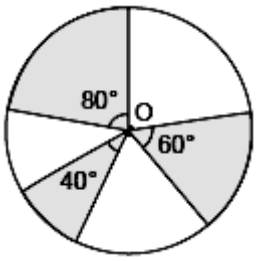
(iv). There is no overall choice.

(v). Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. In the given figure, three sectors of a circle of radius 7 cm, making angles of 60°, 80° and 40° at the centre are shaded. The area of the shaded region (in cm^2) is [Use $\pi = \frac{22}{7}$]



(a) 77 (b) 154 (c) 44 (d) 22

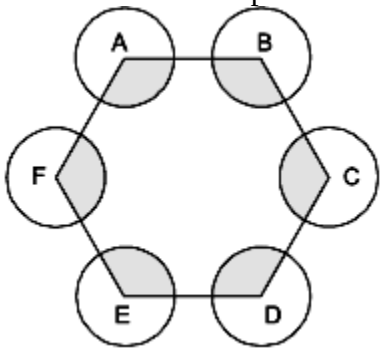
2. The ratio of the areas of the incircle and circumcircle of a square is

(a) 1 : 2 (b) 1 : 3 (c) 1 : 4 (d) 1: $\sqrt{2}$

3. A circular wire of radius 42 cm is cut and bent into the form of a rectangle whose sides are in the ratio of 6 : 5. The smaller side of the rectangle is

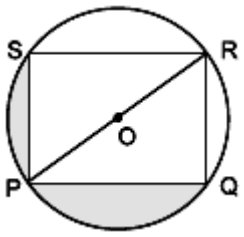
(a) 30 cm (b) 60 cm (c) 70 cm (d) 80 cm

4. ABCDEF is any hexagon with different vertices A, B, C, D, E and F as the centres of circles with same radius r are drawn. The area of the shaded portion is



(a) πr^2 (b) $2\pi r^2$ (c) $3\pi r^2$ (d) $4\pi r^2$

5. In the figure, PQRS is a square and O is centre of the circle. If RS = $10\sqrt{2}$, then area of shaded region is



(a) $90\pi - 90$ (b) $80\pi - 80$ (c) $50\pi - 100$ (d) $100\pi - 100$

6. If the sum of the circumferences of two circles with radii R_1 and R_2 is equal to the circumference of a circle of radius R, then
(a) $R_1 + R_2 = R$ (b) $R_1 + R_2 > R$ (c) $R_1 + R_2 < R$
(d) nothing definite can be said about the relation among R_1, R_2 and R.

7. If the perimeter of a circle is equal to that of a square, then the ratio of the area of circle to the area of the square is
(a) 14: 11 (b) 12: 13 (c) 11:14 (d) 13:12

8. The number of revolutions made by a circular wheel of radius 0.7 m in rolling a distance of 176 m is
(a) 22 (b) 24 (c) 75 (d) 40

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): A bicycle wheel makes 5000 revolutions in covering 11 km. Then diameter of the wheel is 70 cm.

Reason (R): Area of segment of a circle is $\frac{\theta}{360^0} \times \pi r^2 - \frac{1}{2} r^2 \sin\theta$

10. Assertion (A): The length of the minute hand of a clock is 7 cm. Then the area swept by the minute hand in 5 minute is 77/6 cm^2.

Reason (R): The length of an arc of a sector of angle q and radius r is given by $l = \frac{\theta}{360^0} \times 2\pi r$

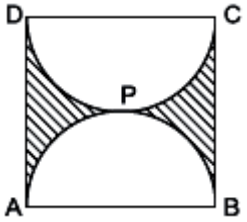
SECTION – B

Questions 11 to 14 carry 2 marks each.

11. The minute hand of a clock is $\sqrt{21}$ cm long. Find the area described by the minute hand on the face of the clock between 7.00 am and 7.05 am. [Use $\pi = \frac{22}{7}$]

12. A horse is placed for grazing inside a rectangular field 70 m by 52 m and is tethered to one corner by a rope 21 m long. On how much area can it graze?

13. Find the perimeter of the shaded region in figure, if ABCD is a square of side 14 cm and APB and CPD are semicircles. [Use $\pi = \frac{22}{7}$]

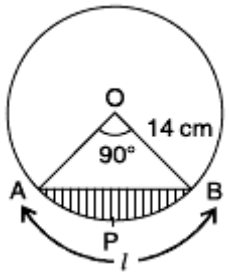


14. An arc of a circle is of length 5π cm and the sector if bounds has an area of 20π cm^2. Find the radius of the circle.

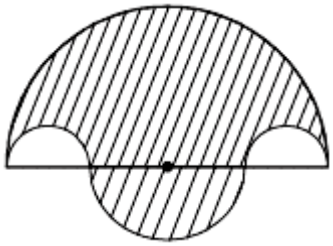
SECTION – C

Questions 15 to 17 carry 3 marks each.

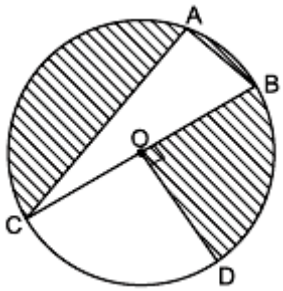
15. Find the area of the segment of a circle of radius 14 cm, if the length of the corresponding arc APB is 22 cm. [Use $\pi = \frac{22}{7}$]



16. In figure, the boundary of shaded region consists of four semicircular arcs, two smallest being equal. If diameter of the largest is 14 cm and that of the smallest is 3.5 cm, calculate the area of the shaded region. [Use $\pi = \frac{22}{7}$]



17. In the given figure, O is the centre of the circle with AC = 24 cm, AB = 7 cm and $\angle BOD = 90°$. Find the area of the shaded region. [Use $\pi = 3.14$]



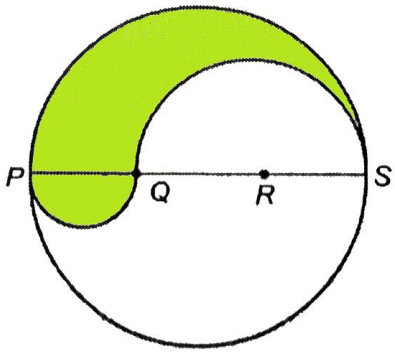
SECTION – D

Questions 18 carry 5 marks.

18. A chord of a circle of radius 15 cm subtends an angle of 60° at the centre. Find the areas of the corresponding minor and major segments of the circle. (Use $\pi = 3.14$ and $\sqrt{3} = 1.73$)

OR

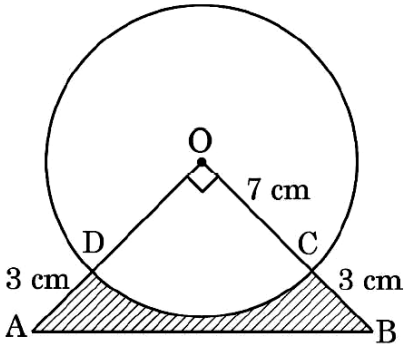
PQRS is a diameter of a circle of radius 6 cm. The lengths PQ, QR and RS are equal. Semi-circles are drawn on PQ and QS as diameters as shown in below figure. Find the perimeter and area of the shaded region (Use $\pi = 3.14$)



SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. In an annual day function of a school, the organizers wanted to give a cash prize along with a memento to their best students. Each memento is made as shown in the figure and its base ABCD is shown from the front side. The rate of silver plating is 20 per cm^2.



Based on the above, answer the following questions :

(i) What is the area of the quadrant ODCO? (1)

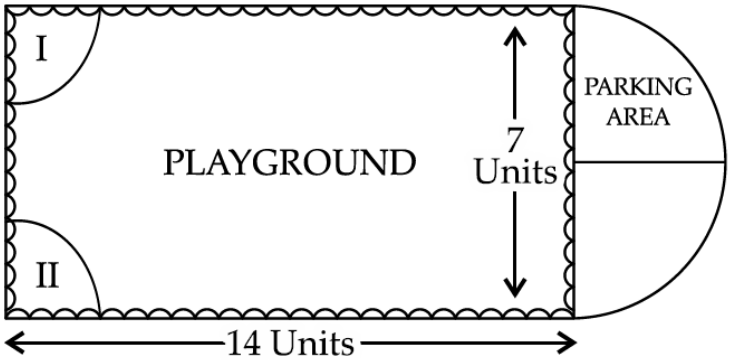
(ii) Find the area of ΔAOB. (1)

(iii) What is the total cost of silver plating the shaded part ABCD? (2)

OR

(iii) What is the length of arc CD? (2)

20. Governing council of a local public development authority of Dehradun decided to build an adventurous playground on the top of a hill, which will have adequate space for parking.



After survey, it was decided to build rectangular playground, with a semi-circular are allotted for parking at one end of the playground. The length and breadth of the rectangular playground are 14 units and 7 units, respectively. There are two quadrants of radius 2 units on one side for special seats.

Based on the above information, answer the following questions:

(i) What is the total perimeter of the parking area?

(ii) (a) What is the total area of parking and the two quadrants?

OR

(b) What is the ratio of area of playground to the area of parking area?

(iii) Find the cost of fencing the playground and parking area at the rate of ` 2 per unit.