• कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 11 हैं।
• प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नम्बर को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
• कृपया जाँच कर लें कि इस प्रश्न-पत्र में 31 प्रश्न हैं।
• कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, प्रश्न का क्रमांक अवश्य लिखें।
• इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का चित्रण पूर्वाँच में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।

Please check that this question paper contains 11 printed pages.
• Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
• Please check that this question paper contains 31 questions.
• Please write down the Serial Number of the question before attempting it.
• 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.
General Instructions:
(i) All questions are compulsory.
(ii) The question paper consists of 31 questions divided into four sections — A, B, C and D.
(iii) Section A contains 4 questions of 1 mark each. Section B contains 6 questions of 2 marks each, Section C contains 10 questions of 3 marks each and Section D contains 11 questions of 4 marks each.
(iv) Use of calculators is not permitted.

खण्ड अ

SECTION A

प्रश्न संख्या 1 से 4 तक प्रत्येक प्रश्न 1 अंक का है।

Question numbers 1 to 4 carry 1 mark each.

1. यदि 30 मी. ऊँची एक मीनार, भूमि पर $10\sqrt{3}$ मी. लंबी छाया बनाती है, तो सूर्य का उन्नयन कोण क्या है?

If a tower 30 m high, casts a shadow $10\sqrt{3}$ m long on the ground, then what is the angle of elevation of the sun?
2. The probability of selecting a rotten apple randomly from a heap of 900 apples is 0.18. What is the number of rotten apples in the heap?

3. What is the common difference of an A.P. in which \( a_{21} - a_7 = 84 \) ?

4. If the angle between two tangents drawn from an external point P to a circle of radius a and centre O, is \( 60^\circ \), then find the length of OP.

SECTION B

Question numbers 5 to 10 carry 2 marks each.

5. A line intersects the y-axis and x-axis at the points P and Q respectively. If (2, -5) is the mid-point of PQ, then find the coordinates of P and Q.

6. If the distances of P(x, y) from A(5, 1) and B(-1, 5) are equal, then prove that \( 3x = 2y \).
7. Find the value of \( p \), for which one root of the quadratic equation \( px^2 - 14x + 8 = 0 \) is 6 times the other.

8. Prove that the tangents drawn at the end points of a chord of a circle make equal angles with the chord.

9. A circle touches all the four sides of a quadrilateral \( ABCD \). Prove that \( AB + CD = BC + DA \)

10. Which term of the A.P. 8, 14, 20, 26, ... will be 72 more than its 41\(^{st}\) term?

**खण्ड स**

**SECTION C**

Question numbers 11 to 20 carry 3 marks each.

11. The dimensions of a solid iron cuboid are 4·4 m \( \times \) 2·6 m \( \times \) 1·0 m. It is melted and recast into a hollow cylindrical pipe of 30 cm inner radius and thickness 5 cm. Find the length of the pipe.
In the given figure, two concentric circles with centre O have radii 21 cm and 42 cm. If $\angle AOB = 60^\circ$, find the area of the shaded region.

[ Use $\pi = \frac{22}{7}$ ]

Water in a canal, 5.4 m wide and 1.8 m deep, is flowing with a speed of 25 km/hour. How much area can it irrigate in 40 minutes, if 10 cm of standing water is required for irrigation?
14. The points \( P(2, -2) \) and \( Q(3, 7) \) are joined by a straight line and a point \( (\frac{24}{11}, y) \) divides this line segment. What is the ratio in which \( y \) divides this line segment joined by two points? Also, find the value of \( y \).

15. The angle of elevation from the foot of a tower is 45° and from a distance of 16 meters away, it is 30°. Find the height of the tower.

16. A bag contains 15 white and some black balls. If the probability of drawing a black ball is 3 times that of a white ball, find the number of black balls in the bag.

17. In a 3 cm sphere, a 3 cm diameter sphere is cut out. Find the volume of the remaining sphere.
Three semicircles each of diameter 3 cm, a circle of diameter 4·5 cm and a semicircle of radius 4·5 cm are drawn in the given figure. Find the area of the shaded region.

18. \[2\cdot4 \text{ सेमी ऊँचाई तथा } 0\cdot7 \text{ सेमी त्रिज्या के एक ठोस लंब-वृत्तीय बेलन से बेलन के समान ऊँचाई व समान त्रिज्या का एक लंब-वृत्तीय शंकु काट कर निकाल लिया जाता है। बचे हुए ठोस का कुल पृष्ठीय क्षेत्रफल ज्ञात कीजिए।

From a solid right circular cylinder of height 2·4 cm and radius 0·7 cm, a right circular cone of same height and same radius is cut out. Find the total surface area of the remaining solid.

19. \[यदि एक समांतर शेढ़ी का 10\text{व} व पद 52 तथा 17\text{व} व पद 13\text{व} व पद से 20 अधिक है, तो समांतर शेढ़ी ज्ञात कीजिए।

If the 10\text{th} term of an A.P. is 52 and the 17\text{th} term is 20 more than the 13\text{th} term, find the A.P.

20. \[यदि \ x \ में समीकरण \ (c^2 - ab) x^2 - 2 (a^2 - bc) x + b^2 - ac = 0 \ के मूल बराबर हों, तो दर्शाइए कि या तो \ a = 0 \ है या \ a^3 + b^3 + c^3 = 3abc \ है।

If the roots of the equation \ (c^2 - ab) x^2 - 2 (a^2 - bc) x + b^2 - ac = 0 \ in \ x \ are equal, then show that either \ a = 0 \ or \ a^3 + b^3 + c^3 = 3abc.
SECTION D

Question numbers 21 to 31 carry 4 marks each.

21. यदि बिंदु A(k + 1, 2k), B(3k, 2k + 3) तथा C(5k – 1, 5k) संरेख हों, तो k का मान ज्ञात कीजिए।

If the points A(k + 1, 2k), B(3k, 2k + 3) and C(5k – 1, 5k) are collinear, then find the value of k.

22. दो विभिन्न पासों को एक साथ फेंका गया। प्रायिकता ज्ञात कीजिए कि प्राप्त संख्याओं का
   (i) योगफल सम होगा, और
   (ii) गुणफल सम होगा।
Two different dice are thrown together. Find the probability that the numbers obtained have
   (i) even sum, and
   (ii) even product.

23. एक त्रिभुज ABC की रचना कीजिए जिसमें भुजा BC = 7 सेमी, ∠B = 45°, ∠A = 105° हो। तब एक अन्य त्रिभुज की रचना कीजिए जिसकी भुजाएँ ∆ABC की संगत भुजाओं की \(\frac{3}{4}\) गुनी हों।

Construct a triangle ABC with side BC = 7 cm, ∠B = 45°, ∠A = 105°. Then construct another triangle whose sides are \(\frac{3}{4}\) times the corresponding sides of the ∆ABC.

24. किसी वर्षा-जल संग्रहण तन्त्र में, 22 मी. × 20 मी. की छत से वर्षा-जल बहकर 2 मी. आधार के व्यास तथा 3.5 मी. ऊंचाई के एक बेलनाकार टैंक में आता है। यदि टैंक भर गया हो, तो ज्ञात कीजिए कि सेमी में कितनी वर्षा हुई। जल संक्षेपण पर अपने विचार व्यक्त कीजिए।

In a rain-water harvesting system, the rain-water from a roof of 22 m × 20 m drains into a cylindrical tank having diameter of base 2 m and height 3.5 m. If the tank is full, find the rainfall in cm. Write your views on water conservation.
25. Prove that the lengths of two tangents drawn from an external point to a circle are equal.

26. In the given figure, $XY$ and $X'Y'$ are two parallel tangents to a circle with centre $O$ and another tangent $AB$ with point of contact $C$, is intersecting $XY$ at $A$ and $X'Y'$ at $B$. Prove that $\angle AOB = 90^\circ$. 

[Diagram of tangents and circle with points labeled X, Y, P, A, Y', Q, B, and O.]
27. If the ratio of the sum of the first n terms of two A.Ps is \((7n + 1) : (4n + 27)\), then find the ratio of their 9th terms.

28. Solve for \(x\):

\[
\frac{1}{2x-3} + \frac{1}{x-5} = 1 \frac{1}{9}, \quad x \neq \frac{3}{2}, \, 5
\]

29. A train covers a distance of 300 km at a uniform speed. If the speed of the train is increased by 5 km/hour, it takes 2 hours less in the journey. Find the original speed of the train.

30. A man observes a car from the top of a tower, which is moving towards the tower with a uniform speed. If the angle of depression of the car changes from 30° to 45° in 12 minutes, find the time taken by the car now to reach the tower.
In the given figure, $\triangle ABC$ is a right-angled triangle in which $\angle A$ is $90^\circ$. Semicircles are drawn on $AB$, $AC$ and $BC$ as diameters. Find the area of the shaded region.