



Series C5ABD/5

SET~2

रोल नं.							
Roll No.							

प्रश्न-पत्र कोड
Q.P. Code **430/5/2**

परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें ।

Candidates must write the Q.P. Code on the title page of the answer-book.

नोट / NOTE :

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **23** हैं ।
Please check that this question paper contains **23** printed pages.
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में **38** प्रश्न हैं ।
Please check that this question paper contains **38** questions.
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें ।
Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में प्रश्न का क्रमांक अवश्य लिखें ।
Please write down the serial number of the question in the answer-book before attempting it.
- इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है । प्रश्न-पत्र का वितरण पूर्वाह्न 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 ।

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.

गणित (बुनियादी)

MATHEMATICS (BASIC)



निर्धारित समय : 3 घण्टे

अधिकतम अंक : 80

Time allowed : 3 hours

Maximum Marks : 80

15-430/5/2

Page 1

P.T.O.



General Instructions :

Read the following instructions very carefully and strictly follow them :

- (i) *This question paper contains **38** questions. **All** questions are **compulsory**.*
- (ii) *This question paper is divided into **five** Sections – **A, B, C, D** and **E**.*
- (iii) *In **Section A**, Questions no. **1** to **18** are Multiple Choice Questions (MCQs) and questions number **19** and **20** are Assertion-Reason based questions of **1** mark each.*
- (iv) *In **Section B**, Questions no. **21** to **25** are Very Short Answer (VSA) type questions, carrying **2** marks each.*
- (v) *In **Section C**, Questions no. **26** to **31** are Short Answer (SA) type questions, carrying **3** marks each.*
- (vi) *In **Section D**, Questions no. **32** to **35** are Long Answer (LA) type questions carrying **5** marks each.*
- (vii) *In **Section E**, Questions no. **36** to **38** are case study based questions carrying **4** marks each. Internal choice is provided in **2** marks questions in each case study.*
- (viii) *There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.*
- (ix) *Draw neat diagrams wherever required. Take $\pi = \frac{22}{7}$ wherever required, if not stated.*
- (x) *Use of calculator is **not** allowed.*

SECTION A

This section comprises multiple choice questions (MCQs) of 1 mark each. 20×1=20

1. A tree casts a shadow 7 m long on the ground, when the angle of elevation of the Sun is 45° . The height of the tree is :

(A) $7\sqrt{3}$ m

(B) $\frac{7}{3}\sqrt{3}$ m

(C) 7 m

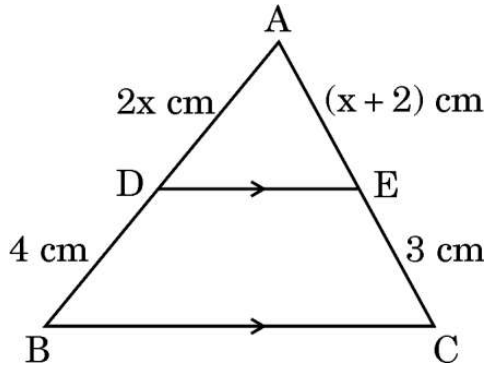
(D) 3.5 m



2. 12 cm त्रिज्या वाले एक वृत्त की एक चाप की लंबाई 10π cm है। यह चाप वृत्त के केंद्र पर जो केंद्रीय कोण अंतरित करती है, वह है :

(A) 120° (B) 6°
(C) 75° (D) 150°

3. दी गई आकृति में, त्रिभुज ABC में, $DE \parallel BC$ है। यदि $AD = 2x$ cm, $AE = (x + 2)$ cm, $DB = 4$ cm, $EC = 3$ cm है, तो x का मान है :



(A) 3 (B) 2
(C) 6 (D) 4

4. संख्याओं 40 और 30 के लिए $HCF \times LCM$ है :

(A) 12 (B) 120
(C) 1200 (D) 40

5. यह दिया गया है कि $\triangle ABC \sim \triangle DEF$. यदि $\angle A = 55^\circ$, $\angle E = 45^\circ$ है, तो $\angle C$ है :

(A) 80° (B) 90°
(C) 55° (D) 45°

6. यदि एक वृत्त की दो त्रिज्याओं के बीच का कोण 130° है, तो इन त्रिज्याओं के सिरों पर बनी स्पर्शरेखाओं के बीच का कोण है :

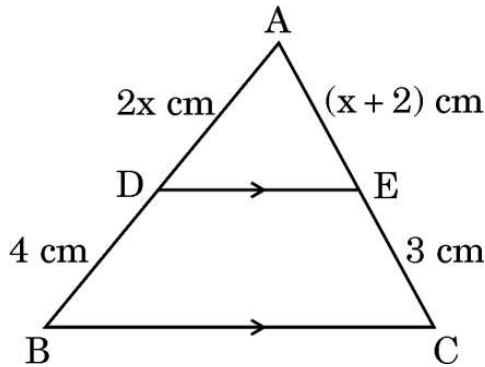
(A) 50° (B) 60°
(C) 90° (D) 130°



2. The length of an arc of a circle with radius 12 cm is 10π cm. The central angle subtended by this arc at the centre, is :

(A) 120° (B) 6°
(C) 75° (D) 150°

3. In the given figure, in $\triangle ABC$, $DE \parallel BC$. If $AD = 2x$ cm, $AE = (x + 2)$ cm, $DB = 4$ cm, $EC = 3$ cm, then the value of x is :



(A) 3 (B) 2
(C) 6 (D) 4

4. $HCF \times LCM$ for the numbers 40 and 30 is :

(A) 12 (B) 120
(C) 1200 (D) 40

5. It is given that $\triangle ABC \sim \triangle DEF$. If $\angle A = 55^\circ$, $\angle E = 45^\circ$, then $\angle C$ is :

(A) 80° (B) 90°
(C) 55° (D) 45°

6. If the angle between the two radii of a circle is 130° , then the angle between the tangents at the ends of these radii, is :

(A) 50° (B) 60°
(C) 90° (D) 130°



7. यदि $\sin^2 \theta = \frac{1}{2}$ है, तो $\tan^2 \theta$ का मान है :

- (A) $\frac{1}{\sqrt{3}}$ (B) $\sqrt{3}$
(C) 0 (D) 1

8. यदि किन्हीं आँकड़ों के बहुलक और माध्यक का अंतर 24 है, तो उन आँकड़ों के माध्यक और माध्य का अंतर है :

- (A) 8 (B) 12
(C) 24 (D) 34

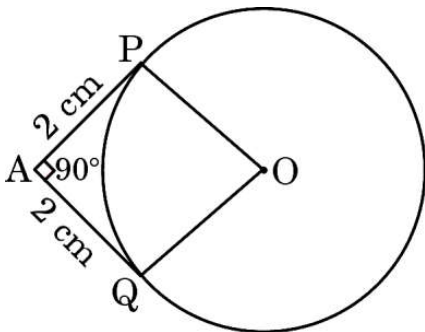
9. एक वृत्त, जिसकी परिधि 22 cm है, के चतुर्थांश (quadrant) का क्षेत्रफल है :

- (A) $\frac{11}{4} \text{ cm}^2$ (B) $\frac{11}{2} \text{ cm}^2$
(C) $\frac{33}{4} \text{ cm}^2$ (D) $\frac{77}{8} \text{ cm}^2$

10. बिंदुओं A(-2, 8) और B(-6, 4) को मिलाने वाले रेखाखंड AB का मध्य-बिंदु है :

- (A) (2, 6) (B) (-4, 12)
(C) (-4, 6) (D) (4, -6)

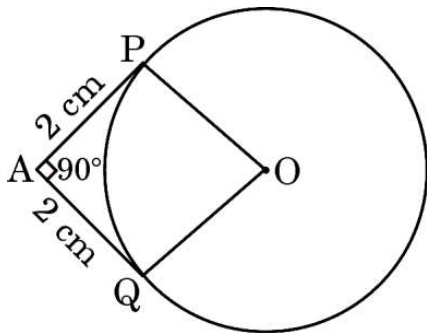
11. केंद्र O वाले वृत्त पर बाह्य बिंदु A से दो स्पर्श-रेखाएँ AP और AQ परस्पर 90° के कोण पर झुकी हुई हैं। यदि प्रत्येक स्पर्श-रेखा की लंबाई 2 cm है, तो वृत्त की त्रिज्या है :



- (A) 4 cm (B) 2 cm
(C) $2\sqrt{2} \text{ cm}$ (D) 1 cm



7. If $\sin^2 \theta = \frac{1}{2}$, then the value of $\tan^2 \theta$ is :
- (A) $\frac{1}{\sqrt{3}}$ (B) $\sqrt{3}$
(C) 0 (D) 1
8. If the difference of mode and median of a data is 24, then the difference of median and mean of the same data is :
- (A) 8 (B) 12
(C) 24 (D) 34
9. The area of a quadrant of a circle whose circumference is 22 cm, is :
- (A) $\frac{11}{4} \text{ cm}^2$ (B) $\frac{11}{2} \text{ cm}^2$
(C) $\frac{33}{4} \text{ cm}^2$ (D) $\frac{77}{8} \text{ cm}^2$
10. The mid-point of the line segment AB joining A(- 2, 8) and B(- 6, 4) is :
- (A) (2, 6) (B) (- 4, 12)
(C) (- 4, 6) (D) (4, - 6)
11. AP and AQ are tangents drawn from an external point A to a circle with centre O and inclined to each other at an angle of 90° . If the length of each tangent is 2 cm, then the radius of the circle is :



- (A) 4 cm (B) 2 cm
(C) $2\sqrt{2}$ cm (D) 1 cm



12. रैखिक समीकरण युग्म $2kx + 5y = 7$, $6x + 5y = 11$ का केवल एक अद्वितीय हल होगा, यदि
- (A) $k \neq 3$ (B) $k \neq -3$
(C) $k \neq \frac{1}{3}$ (D) $k \neq -\frac{1}{3}$
13. यदि x एक पूर्ण संख्या है, तो x के किस मान को छोड़कर 8^x सम अंक पर समाप्त होता है ?
- (A) 6 (B) 4
(C) 2 (D) 0
14. $\left(\frac{5}{\cot^2 \theta} - \frac{5}{\cos^2 \theta} \right)$ बराबर है :
- (A) 1 (B) 5
(C) -5 (D) 0
15. द्विघात समीकरण $x^2 - 4x + 3 = 0$ का विविक्तकर (discriminant) है :
- (A) 28 (B) -8
(C) 4 (D) 2
16. एक थैले में 4 लाल गेंद और 2 पीली गेंद हैं। एक गेंद यादृच्छया इस थैले से, बिना थैले में देखे, निकाली जाती है। पीली गेंद प्राप्त होने की प्रायिकता क्या है ?
- (A) $\frac{1}{6}$ (B) $\frac{2}{3}$
(C) $\frac{1}{3}$ (D) 1
17. द्विघात समीकरण $x^2 + 3x + 2 = 0$ के मूल हैं :
- (A) -1, -2 (B) 1, 2
(C) 1, -2 (D) -1, 2



12. The pair of linear equations $2kx + 5y = 7$, $6x + 5y = 11$ have a unique solution, if
- (A) $k \neq 3$ (B) $k \neq -3$
(C) $k \neq \frac{1}{3}$ (D) $k \neq -\frac{1}{3}$
13. If x is a whole number, then 8^x ends with an even digit, except for which value of x ?
- (A) 6 (B) 4
(C) 2 (D) 0
14. $\left(\frac{5}{\cot^2 \theta} - \frac{5}{\cos^2 \theta} \right)$ is equal to :
- (A) 1 (B) 5
(C) -5 (D) 0
15. The discriminant of the quadratic equation $x^2 - 4x + 3 = 0$ is :
- (A) 28 (B) -8
(C) 4 (D) 2
16. A bag has 4 red balls and 2 yellow balls. A ball is drawn at random from the bag without looking into the bag. What is the probability of getting a yellow ball ?
- (A) $\frac{1}{6}$ (B) $\frac{2}{3}$
(C) $\frac{1}{3}$ (D) 1
17. The roots of the quadratic equation $x^2 + 3x + 2 = 0$, are :
- (A) $-1, -2$ (B) $1, 2$
(C) $1, -2$ (D) $-1, 2$



18. Prime factorisation of 882 is :

- (A) $2^2 \times 3^2 \times 7$ (B) $2^3 \times 3 \times 7^2$
(C) $2 \times 3^2 \times 7^2$ (D) $2^2 \times 3^3 \times 7$

Questions number 19 and 20 are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

- (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.

19. Assertion (A) : Common difference of the A.P. 5, 1, - 3, - 7 is 4.

Reason (R) : Common difference of the A.P. $a_1, a_2, a_3, \dots, a_n$ is obtained by $d = a_n - a_{n-1}$.

20. Assertion (A) : The probability of getting number 8 on rolling a die is zero (0).

Reason (R) : The probability of an impossible event is zero (0).



SECTION B

This section comprises Very Short Answer (VSA) type questions of 2 marks each.

5×2=10

21. If $\frac{1}{2}$ is a root of the quadratic equation $x^2 + kx - \frac{5}{4} = 0$, then find the value of k .
22. Evaluate : $\tan^2 30^\circ - \tan^2 60^\circ + \operatorname{cosec}^2 45^\circ$
23. The length of a tangent drawn to a circle from a point A, at a distance of 10 cm from the centre of the circle, is 6 cm. Find the radius of the circle.
24. (a) If α, β are zeroes of the quadratic polynomial $2x^2 + 7x + 5$, then find the value of $\alpha^2 + \beta^2 + \alpha\beta$.

OR

- (b) If one zero of the quadratic polynomial $6x^2 + 37x - (p - 2)$ is reciprocal of the other, then find the value of p .
25. (a) Find the ratio in which the point $(3, y)$, divides the line segment joining the points $(-2, -5)$ and $(6, 3)$. Also, find the value of y .

OR

- (b) Find a point on y -axis which is equidistant from the points $A(6, 5)$ and $B(-4, 3)$.



SECTION C

This section comprises Short Answer (SA) type questions of 3 marks each. 6×3=18

26. (a) Prove that the parallelogram circumscribing a circle is a rhombus.

OR

- (b) Prove that the lengths of the tangents drawn from an external point to a circle are equal.

27. (a) A horse is tied with a 14 m long rope at one corner of an equilateral triangular field having side 20 m. Find the area of the field where the horse cannot graze.

OR

- (b) The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand between 8:00 am and 8:05 am.

28. Find the coordinates of the points of trisection of the line segment joining the points A(5, – 3) and B(– 4, 3).

29. Prove that $3 - 2\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.

30. Prove that : $(\operatorname{cosec} \theta - \sin \theta)(\sec \theta - \cos \theta) = \frac{1}{\tan \theta + \cot \theta}$.

31. Find the zeroes of the quadratic polynomial $6x^2 - 7x - 3$ and verify the relationship between the zeroes and the coefficients of the polynomial.



खण्ड घ

इस खण्ड में दीर्घ-उत्तरीय (LA) प्रकार के प्रश्न हैं, जिनमें प्रत्येक के 5 अंक हैं।

4×5=20

32. यदि एक भिन्न के अंश में 2 जोड़ दिया जाए तथा हर में 1 जोड़ा जाए, तो यह भिन्न $\frac{3}{4}$ हो जाता है। यदि अंश में से 2 तथा हर में से 1 घटाया जाए, तो यह $\frac{1}{2}$ बन जाता है। भिन्न ज्ञात कीजिए।

33. निम्नलिखित सारणी में एक वर्ष में एक अस्पताल में भर्ती हुए रोगियों की आयु के आँकड़े दिए गए हैं :

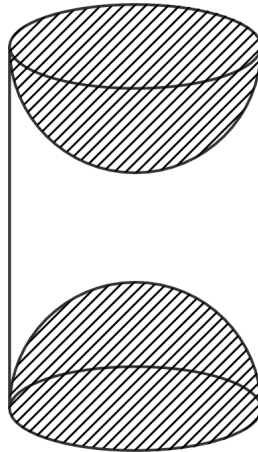
आयु (वर्षों में)	5 – 15	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65
रोगियों की संख्या	6	11	21	23	14	5

उपर्युक्त आँकड़ों का माध्यक ज्ञात कीजिए।

34. (a) एक खिलौना एक 7 cm त्रिज्या के शंकु के आकार का है जो समान त्रिज्या के एक अर्धगोले पर आरोपित है। इस खिलौने की कुल ऊँचाई 31 cm है। इस खिलौने का पृष्ठीय क्षेत्रफल ज्ञात कीजिए।

अथवा

- (b) लकड़ी के एक ठोस बेलन के प्रत्येक सिरे से एक अर्धगोला खोदकर निकालने पर लकड़ी की एक वस्तु बनाई जाती है। यदि बेलन की ऊँचाई 15 cm और उसके आधार की त्रिज्या 4.2 cm है, तो इस बनाई गई वस्तु का कुल पृष्ठीय क्षेत्रफल ज्ञात कीजिए।





SECTION D

This section comprises Long Answer (LA) type questions of 5 marks each.

4×5=20

32. A fraction becomes $\frac{3}{4}$, if 2 is added to the numerator and 1 is added to the denominator. If 2 is subtracted from the numerator and 1 is subtracted from the denominator, it becomes $\frac{1}{2}$. Find the fraction.

33. The following table shows the ages of the patients admitted in a hospital during a year :

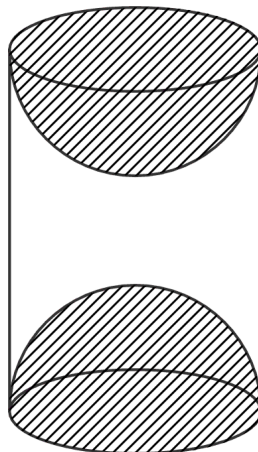
Age (in years)	5 – 15	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65
Number of patients	6	11	21	23	14	5

Find the median of the above given data.

34. (a) A toy is in the form of a cone of radius 7 cm mounted on a hemisphere of same radius. The total height of the toy is 31 cm. Find the surface area of the toy.

OR

- (b) A wooden article was made by scooping out a hemisphere from each end of a solid cylinder. If the height of the cylinder is 15 cm and its base is of radius 4.2 cm, then find the total surface area of the article.





35. (a) Sides AB, BC and median AD of ΔABC are respectively proportional to sides PQ, QR and median PM of ΔPQR . Show that $\Delta ABC \sim \Delta PQR$.

OR

- (b) Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides at distinct points, then the other two sides are divided in the same ratio.

SECTION E

This section comprises 3 case study based questions of 4 marks each.

3×4=12

Case Study – 1

36. Sumant's mother started a new shoe shop. To display the shoes, she put 3 pairs of shoes in the 1st row, 5 pairs in the 2nd row, 7 pairs in the 3rd row and so on.



Based on the above information, answer the following questions :

- (i) How many pairs of shoes are displayed in the 6th row ? 1
- (ii) What is the difference of pairs of shoes in the 1st row and the 6th row ? 1
- (iii) (a) Find the total number of pairs of shoes displayed in the first 15 rows. 2

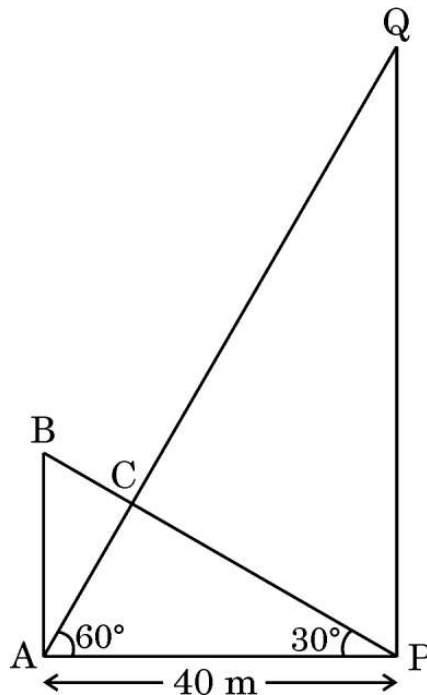
OR

- (b) If the pairs of shoes displayed in the 4th row are 'on sale' at price of ₹ 500 for each pair, then find the total amount (money) earned by Sumant's mother if all shoes displayed in the 4th row are sold out. 2



Case Study – 2

- 37.** Two poles of different heights stand on level ground and at a distance of 40 m. Both poles are supported by wires attached from the top of each pole to the bottom of the other. A coupling is placed at point C, where the two wires cross (as shown in the figure).



Based on the above information, answer the following questions :

- (i) Find the height of pole AB. 1
- (ii) Find the height of pole PQ. 1
- (iii) (a) If the angle of elevation of the top of the pole PQ from the top of the pole AB is 30° , find the distance BQ. 2

OR

- (b) If the coupling is at a height of 20 m from the ground, how far down the wire from the smaller pole AB is the coupling ? 2



Case Study – 3

38. **Family structure :** In a recent survey of this year, 51% of the families in the United States of America had no children, 20% had one child, 19% had two children, 7% had three children and 3% had four or more children.



A family is selected at random.

Based on the above information, answer the following questions :

- (i) Find the probability that the selected family has two or three children. 1
- (ii) Find the probability that the selected family has more than one child. 1
- (iii) (a) Find the probability that the selected family has less than three children. 2

OR

- (b) Find the probability that the selected family has more than two children. 2