



Series C5ABD/5

SET~1

रोल नं.							
Roll No.							

प्रश्न-पत्र कोड
Q.P. Code **430/5/1**

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



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. HCF × LCM for the numbers 40 and 30 is :

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



2. द्विघात समीकरण $x^2 + 3x - 10 = 0$ के मूल हैं :
- (A) 5, 2 (B) -5, 2
(C) 5, -2 (D) -5, -2
3. 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) $k \neq -\frac{1}{3}$
4. यदि एक बारंबारता बंटन का माध्य और बहुलक क्रमशः 28 और 16 हैं, तो इस बंटन का माध्यक है :
- (A) 22 (B) 23.5
(C) 24 (D) 24.5
5. एक पासा एक बार लुढ़काया गया । एक विषम अभाज्य संख्या प्राप्त होने की प्रायिकता क्या है ?
- (A) $\frac{1}{6}$ (B) $\frac{1}{3}$
(C) $\frac{2}{3}$ (D) $\frac{3}{4}$
6. यदि किसी वृत्त के एक त्रिज्यखण्ड का क्षेत्रफल, वृत्त के क्षेत्रफल का $\frac{1}{8}$ है, तो त्रिज्यखण्ड का केंद्रीय कोण है :
- (A) 30° (B) 45°
(C) 60° (D) 90°
7. संख्या 424 का अभाज्य गुणनखंडन है :
- (A) $2 \times 53 \times 4$ (B) $2 \times 53 \times 2$
(C) $2^3 \times 53$ (D) $2^4 \times 53$



2. The roots of the quadratic equation $x^2 + 3x - 10 = 0$ are :
- (A) 5, 2 (B) -5, 2
(C) 5, -2 (D) -5, -2
3. 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) $k \neq -\frac{1}{3}$
4. If the mean and mode of a frequency distribution are 28 and 16 respectively, then its median is :
- (A) 22 (B) 23.5
(C) 24 (D) 24.5
5. A die is rolled once. What is the probability of getting an odd prime number ?
- (A) $\frac{1}{6}$ (B) $\frac{1}{3}$
(C) $\frac{2}{3}$ (D) $\frac{3}{4}$
6. If the area of a sector of a circle is $\frac{1}{8}$ of the area of the circle, then the central angle of the sector is :
- (A) 30° (B) 45°
(C) 60° (D) 90°
7. Prime factorisation of 424 is :
- (A) $2 \times 53 \times 4$ (B) $2 \times 53 \times 2$
(C) $2^3 \times 53$ (D) $2^4 \times 53$



8. 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
9. जमीन पर खड़े एक पेड़ की छाया 7 m लंबी है, जब सूर्य का उन्नतांश 45° है। पेड़ की ऊँचाई है :
- (A) $7\sqrt{3}$ m (B) $\frac{7}{3}\sqrt{3}$ m
(C) 7 m (D) 3.5 m
10. $\left(\frac{5}{\cot^2 \theta} - \frac{5}{\cos^2 \theta} \right)$ बराबर है :
- (A) 1 (B) 5
(C) -5 (D) 0
11. यदि $\tan^2 \theta = 3$, जहाँ θ एक न्यून कोण है, तो θ का मान है :
- (A) 30° (B) 60°
(C) 0° (D) 45°
12. 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°
13. यदि एक वृत्त की दो त्रिज्याओं के बीच का कोण 130° है, तो इन त्रिज्याओं के सिरों पर बनी स्पर्श-रेखाओं के बीच का कोण है :
- (A) 50° (B) 60°
(C) 90° (D) 130°



8. 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
9. 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
10. $\left(\frac{5}{\cot^2 \theta} - \frac{5}{\cos^2 \theta} \right)$ is equal to :
- (A) 1 (B) 5
(C) -5 (D) 0
11. If $\tan^2 \theta = 3$, where θ is an acute angle, then the value of θ is :
- (A) 30° (B) 60°
(C) 0° (D) 45°
12. 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°
13. 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°



14. द्विघात समीकरण $x^2 - 4x + 3 = 0$ का विविक्तकर (discriminant) है :

(A) 28

(B) -8

(C) 4

(D) 2

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

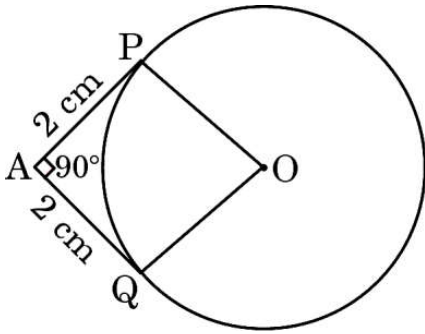
(A) (2, 6)

(B) (-4, 12)

(C) (-4, 6)

(D) (4, -6)

16. 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) $2\sqrt{2}$ cm

(D) 1 cm

17. 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°

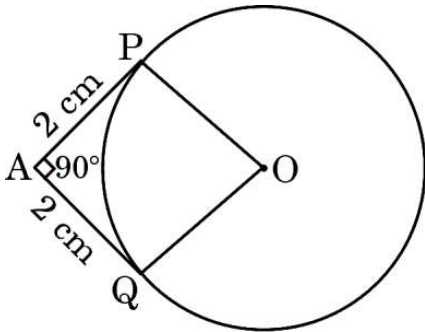
(B) 90°

(C) 55°

(D) 45°

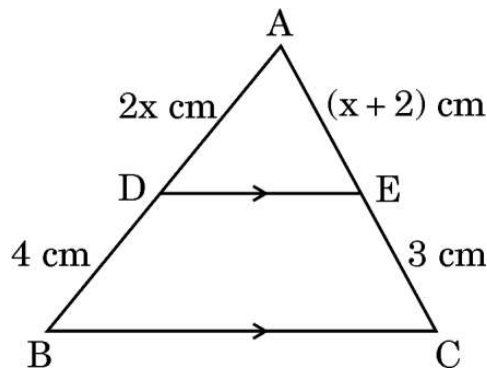


14. The discriminant of the quadratic equation $x^2 - 4x + 3 = 0$ is :
- (A) 28 (B) -8
(C) 4 (D) 2
15. The mid-point of the line segment AB joining A(-2, 8) and B(-6, 4) is :
- (A) (2, 6) (B) (-4, 12)
(C) (-4, 6) (D) (4, -6)
16. AP and AQ are tangents drawn from an external point A to a circle with centre 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
17. 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°

- 18.** 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

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

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

- 20.** Assertion (A) : Common difference of the A.P. $5, 1, -3, -7 \dots$ is 4.

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



SECTION B

This section comprises Very Short Answer (VSA) type questions of 2 marks each. *5×2=10*

21. Evaluate : $\sin^2 30^\circ + \cos^2 45^\circ - \cos 0^\circ \cdot \tan 45^\circ$
22. (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 $B(-4, 3)$.
23. If $\frac{2}{3}$ is a root of the quadratic equation $kx^2 - x - 2 = 0$, then find the value of k .
24. 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.
25. (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 .



SECTION C

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

26. Prove that $6 + 3\sqrt{2}$ is an irrational number, given that $\sqrt{2}$ is an irrational number.
27. Find the zeroes of the quadratic polynomial $6x^2 - 7x - 3$ and verify the relationship between the zeroes and the coefficients of the polynomial.
28. Prove that : $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$.
29. (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.
30. (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.
31. Find the coordinates of the points of trisection of the line segment joining the points A(5, - 3) and B(- 4, 3).



खण्ड घ

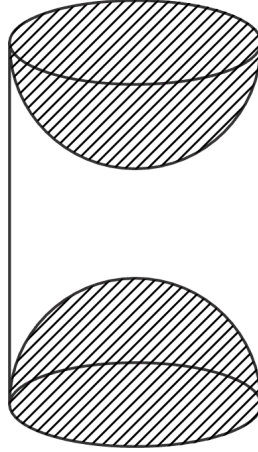
इस खण्ड में दीर्घ-उत्तरीय (LA) प्रकार के प्रश्न हैं, जिनमें प्रत्येक के 5 अंक हैं।

4×5=20

32. (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।



33. दो व्यक्तियों की मासिक आय का अनुपात 9 : 7 है और उनके खर्चों का अनुपात 4 : 3 है। यदि प्रत्येक व्यक्ति प्रति महीने में ₹ 2,000 बचा लेता है, तो उनकी मासिक आय ज्ञात कीजिए।

34. (a) एक त्रिभुज ABC की भुजाएँ AB, BC तथा माध्यिका AD एक अन्य त्रिभुज PQR की क्रमशः भुजाओं PQ, QR तथा माध्यिका PM के समानुपाती हैं। दर्शाइए कि $\Delta ABC \sim \Delta PQR$ है।

अथवा

- (b) सिद्ध कीजिए कि यदि किसी त्रिभुज की एक भुजा के समांतर अन्य दो भुजाओं को भिन्न-भिन्न बिन्दुओं पर प्रतिच्छेदन करने के लिए एक रेखा खींची जाए, तो अन्य दो भुजाएँ एक ही अनुपात में विभाजित होती हैं।



SECTION D

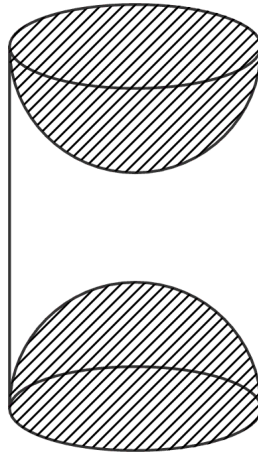
This section comprises Long Answer (LA) type questions of 5 marks each.

4×5=20

- 32.** (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.



- 33.** The ratio of monthly incomes of two persons is 9 : 7 and the ratio of their expenditures is 4 : 3. If each of them manages to save ₹ 2,000 per month, then find their monthly incomes.
- 34.** (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.



35. The following frequency distribution table gives the monthly consumption of electricity of 70 consumers of a locality. Find the median of the data.

Monthly consumption (in units)	Number of consumers
65 – 85	7
85 – 105	8
105 – 125	7
125 – 145	20
145 – 165	14
165 – 185	9
185 – 205	5

SECTION E

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

$3 \times 4 = 12$

Case Study – 1

36. **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

Case Study – 2

37. 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

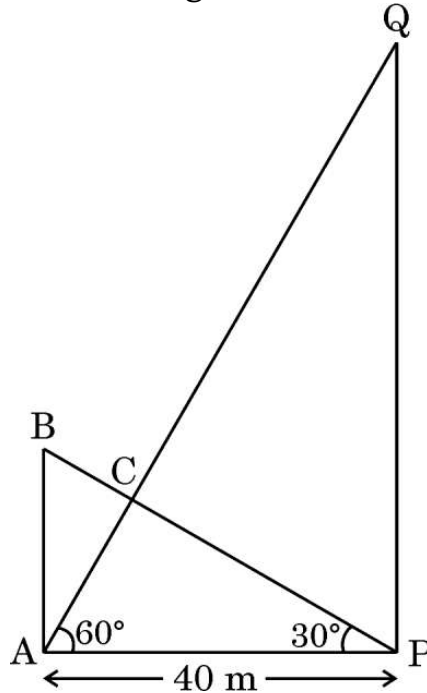
OR

- (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 – 3

38. 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