



Series CD1BA/3

SET~2

रोल नं. Roll No.							

प्रश्न-पत्र कोड
Q.P. Code **430/3/2**

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 परीक्षार्थी 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 candidates 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

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

430/3/2/CD1BA/22

109 B

Page 1

P.T.O.



General Instructions :

Read the following instructions very carefully and follow them :

- (i) *This question paper contains 38 questions. All questions are compulsory.*
- (ii) *Question Paper is divided into 5 Sections – Section A, B, C, D and E.*
- (iii) *In Section–A question number 1 to 18 are Multiple Choice Questions (MCQs) and question number 19 & 20 are Assertion-Reason based questions of 1 mark each.*
- (iv) *In Section–B question number 21 to 25 are Very Short Answer (VSA) type questions of 2 marks each.*
- (v) *In Section–C question number 26 to 31 are Short Answer (SA) type questions carrying 3 marks each.*
- (vi) *In Section–D question number 32 to 35 are Long Answer (LA) type questions carrying 5 marks each.*
- (vii) *In Section–E question number 36 to 38 are Case Study based questions carrying 4 marks each. Internal choice is provided in 2 marks question 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 figures wherever required. Take $\pi = 22/7$ wherever required if not stated.*
- (x) *Use of calculators is NOT allowed.*



Section – A

20 × 1 = 20

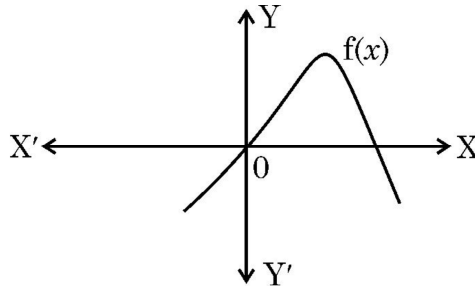
(Multiple Choice Questions)

Q. No. 1 to 20 are Multiple Choice Questions of 1 mark each.

1. A die is thrown once. The probability of getting a number less than 6, is : 1

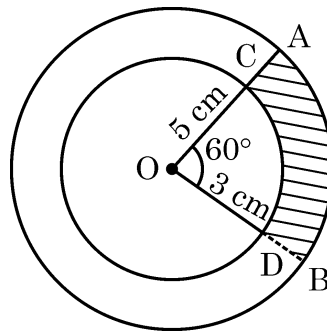
- (A) 0 (B) $\frac{5}{6}$
(C) $\frac{1}{6}$ (D) 1

2. In the given figure, graph of a polynomial $f(x)$ is shown. The number of zeroes of polynomial $f(x)$ is 1



- (A) 3 (B) 1
(C) 0 (D) 2

3. In the given figure, two concentric circles of radii 5 cm and 3 cm have their centre O. OAB is a sector of outer circle making an angle of 60° at the centre while OCD is the sector of smaller circle. The area of the shaded region is : 1



- (A) $\frac{7\pi}{2} \text{ cm}^2$ (B) $\frac{8\pi}{3} \text{ cm}^2$
(C) $\frac{25\pi}{6} \text{ cm}^2$ (D) $\frac{3\pi}{2} \text{ cm}^2$



4. यदि $\sin A = \frac{1}{2}$ है, तो $\cot A$ का मान है :

1

(A) $\frac{1}{\sqrt{3}}$

(B) 1

(C) $\sqrt{3}$

(D) $\frac{2}{\sqrt{3}}$

5. भुजा 14 cm वाले एक ठोस घन में से अधिकतम व्यास का एक गोला काटकर निकाला गया। गोले की त्रिज्या है :

1

(A) 7 cm

(B) 14 cm

(C) $\frac{7}{2}$ cm

(D) $\sqrt{14}$ cm

6. समांतर श्रेढ़ी $-3, -7, -11, \dots$ का 30वाँ पद है :

1

(A) 113

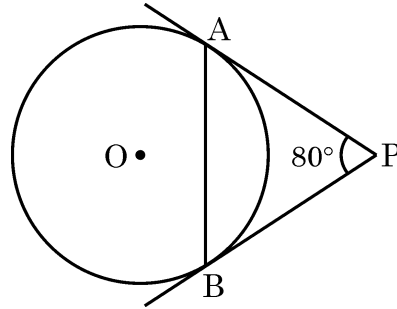
(B) -117

(C) -119

(D) -120

7. दी गई आकृति में, एक वृत्त पर बाह्य बिंदु P से खींची गई स्पर्श-रेखाएँ PA तथा PB परस्पर 80° के कोण पर झुकी हुई हैं। $\angle PAB$ का माप है :

1



(A) 80°

(B) 60°

(C) 50°

(D) 40°

8. एक द्विघात बहुपद, जिसके शून्यक -8 तथा 3 हैं, है :

1

(A) $(x + 8)(x + 3)$

(B) $x^2 + 5x + 24$

(C) $(x - 8)(x - 3)$

(D) $x^2 + 5x - 24$



4. If $\sin A = \frac{1}{2}$, then $\cot A$ is equal to 1

- (A) $\frac{1}{\sqrt{3}}$ (B) 1
(C) $\sqrt{3}$ (D) $\frac{2}{\sqrt{3}}$

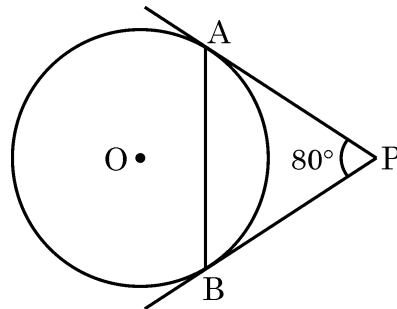
5. From a solid cube of side 14 cm, a sphere of maximum diameter is carved out. The radius of sphere is : 1

- (A) 7 cm (B) 14 cm
(C) $\frac{7}{2}$ cm (D) $\sqrt{14}$ cm

6. The 30th term of the A.P. $-3, -7, -11, \dots$ is : 1

- (A) 113 (B) -117
(C) -119 (D) -120

7. In the given figure, tangents PA and PB drawn from P to circle are inclined to each other at an angle of 80° . The measure of $\angle PAB$ is 1



- (A) 80° (B) 60°
(C) 50° (D) 40°

8. A quadratic polynomial whose zeroes are -8 and 3 , is 1

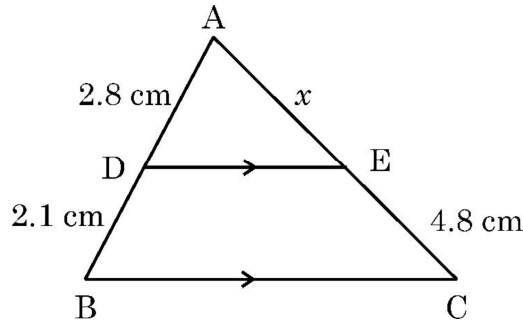
- (A) $(x + 8)(x + 3)$ (B) $x^2 + 5x + 24$
(C) $(x - 8)(x - 3)$ (D) $x^2 + 5x - 24$



9. रेखिक समीकरणों $x = a$ तथा $y = b$ ($a \neq b$) द्वारा निरूपित रेखाएँ 1

- (A) (a, b) पर प्रतिच्छेदी हैं। (B) (b, a) पर प्रतिच्छेदी हैं।
(C) समांतर हैं। (D) संपाती हैं।

10. यदि दी गई आकृति में, $DE \parallel BC$ है। यदि $AD = 2.8$ cm, $DB = 2.1$ cm तथा $EC = 4.8$ cm है, तो x का मान है : 1



- (A) 3.6 cm (B) 2.4 cm
(C) 6.4 cm (D) 4.8 cm

11. यदि किन्हीं आँकड़ों का माध्य तथा माध्यक क्रमशः 10 तथा 11 हैं, तो इन आँकड़ों का बहुलक है : 1

- (A) 12 (B) 8
(C) 20 (D) 13

12. दो निष्पक्ष सिक्कों को एक साथ उछाला गया। 2 चित आने की प्रायिकता है : 1

- (A) $\frac{1}{2}$ (B) $\frac{3}{4}$
(C) $\frac{1}{4}$ (D) $\frac{3}{8}$

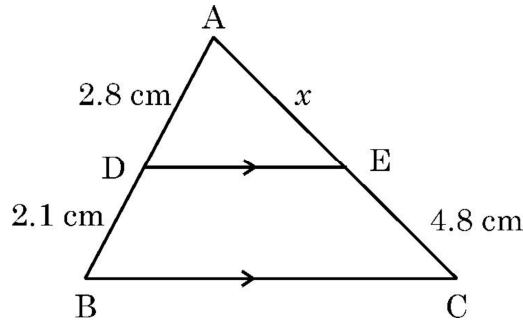
13. k का/के वे मान जिनके लिए द्विघात समीकरण $5x^2 - 9kx + 5 = 0$ के मूल वास्तविक और समान हैं, 1

- (A) $-\frac{10}{9}$ (B) $\pm \frac{9}{10}$
(C) $\frac{10}{9}$ (D) $\pm \frac{10}{9}$



9. The lines represented by linear equations $x = a$ and $y = b$ ($a \neq b$) are 1
- (A) intersecting at (a, b) . (B) intersecting at (b, a) .
(C) parallel. (D) coincident.

10. If in the given figure, $DE \parallel BC$. If $AD = 2.8$ cm, $DB = 2.1$ cm and $EC = 4.8$ cm, then the value of x is : 1



- (A) 3.6 cm (B) 2.4 cm
(C) 6.4 cm (D) 4.8 cm
11. If the mean and median of a data are 10 and 11 respectively, then mode of the data is : 1
- (A) 12 (B) 8
(C) 20 (D) 13

12. Two fair coins are tossed together. The probability of getting 2 heads, is : 1
- (A) $\frac{1}{2}$ (B) $\frac{3}{4}$
(C) $\frac{1}{4}$ (D) $\frac{3}{8}$

13. The value(s) of k for which the quadratic equation $5x^2 - 9kx + 5 = 0$ has real and equal roots, is/are : 1
- (A) $-\frac{10}{9}$ (B) $\pm \frac{9}{10}$
(C) $\frac{10}{9}$ (D) $\pm \frac{10}{9}$



14. The distance between the points A(5, -4) and B(4, -5) is 1
- (A) $\sqrt{2}$ units (B) 2 units
- (C) 1 unit (D) $9\sqrt{2}$ units
15. In a right-angled triangle ABC, $\angle A = 90^\circ$ and $AB = AC$. The value of $\sin C$ is : 1
- (A) 0 (B) $\frac{\sqrt{3}}{2}$
- (C) $\frac{1}{2}$ (D) $\frac{1}{\sqrt{2}}$
16. If for a distribution, $\sum_1^n f_i x_i = 132 + 5p$, $\sum_1^n f_i = 20$ and the mean of the distribution is 8.1, then the value of p is : 1
- (A) 3 (B) 6
- (C) 4 (D) 5
17. From an external point P, a tangent PA is drawn to a circle. The number of tangents through P parallel to PA is : 1
- (A) 2 (B) more than 2
- (C) 1 (D) 0
18. If the volume of a sphere is $\frac{11}{21} \text{ cm}^3$, then the radius of the sphere is : 1
- (A) 2 cm (B) 4 cm
- (C) $\frac{1}{2}$ cm (D) $\frac{1}{4}$ cm



(Assertion – Reason based questions)

Directions : In question numbers **19** and **20**, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option from the following :

- (A) Both Assertion (A) and Reason (R) are true. Reason (R) is the correct explanation of Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true. 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) :** $\sqrt{2}(5 - \sqrt{2})$ is an irrational number. 1

Reason (R) : Product of two irrational numbers is always irrational.

20. **Assertion (A) :** The distance of P(a, b) from origin is $a^2 + b^2$. 1

Reason (R) : The distance between two points A(x_1, y_1) and B(x_2, y_2) is

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$

Section – B

(Very Short Answer Type Questions)

Q. No. **21** to **25** are Very Short Answer type questions of **2** marks each.

21. (a) Prove that $-7 - 2\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number. 2

OR

(b) Explain why $(7 \times 11 \times 13 + 2 \times 11)$ is not a prime number. 2

22. There are 80 cards numbered from 1 to 80. One card is drawn at random from them. Find the probability that the number on the selected card is not divisible by 8. 2



23. Find a point which is equidistant from the points A(-1, 5) and B(2, 1).
How many such points are there ? 2

24. (a) If Q(0, 2) is equidistant from P(5, -3) and R(x, 7), find the value(s) of x. 2

OR

- (b) If A(1, 1) and B(7, 9) are the end points of a diameter of a circle, then
find the co-ordinates of the centre of the circle. 2

25. Evaluate : $3 \sec^2 30^\circ \operatorname{cosec} 30^\circ + \tan^2 60^\circ \cdot \tan^2 45^\circ$ 2

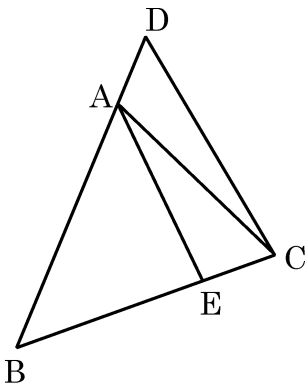
Section – C

(Short Answer Type Questions)

Q. No. 26 to 31 are Short Answer type questions of 3 marks each.

26. Find the zeroes of the polynomial $2x^2 + 3x - 9$ and verify the relationship
between the zeroes and the co-efficients of polynomial. 3

27. In the given figure, $\angle ABC = \angle ACB$ and $\frac{BC}{BE} = \frac{BD}{AC}$. 3



Show that $\triangle ABE \sim \triangle DBC$ and $AE \parallel DC$.



28. The altitude of a right-angled triangle is 7 cm less than its base. If its hypotenuse is 17 cm long, then 3
- (a) represent the above information in the form of a quadratic equation;
- (b) find the length of the sides of the triangle.

29. Find the HCF and LCM of 96 and 404, using prime-factorisation method. 3

30. (a) Prove that $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$. 3

OR

- (b) If $\cos A = \frac{5}{13}$, then verify that $\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \cos A + \sin A$. 3

31. (a) A vessel is in the form of a hollow hemisphere surmounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area of the vessel. 3

OR

- (b) A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. 3

Section – D

(Long Answer Type Questions)

Q. No. 32 to 35 are Long Answer type questions of 5 marks each.

32. (a) Using graphical method, solve the following pair of equations : 5
- $$x + 2y = 8 \text{ and } 3x - 2y = 12$$

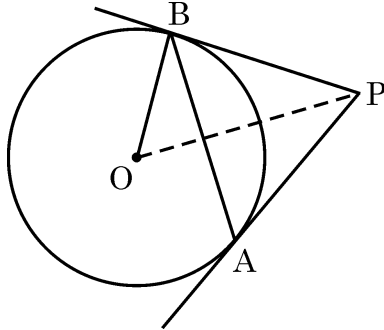
OR

- (b) The sum of the digits of a 2-digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits. Find the number. 5

33. A man standing on the deck of a ship, which is 10 m above water level, observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of the hill as 30° . Find the distance of the hill from the ship and the height of the hill. (Take $\sqrt{3} = 1.73$) 5



34. (a) In the given figure, AB is chord of length 6 cm of a circle of radius 5 cm. The tangents at A and B intersect at a point P. Find the length of PB. 5



OR

- (b) Prove that the parallelogram circumscribing a circle is a rhombus. Also, find area of the rhombus, if radius of circle is 3 cm and length of one side of the rhombus is 10 cm. 5

35. Find the mean and median of the following distribution : 5

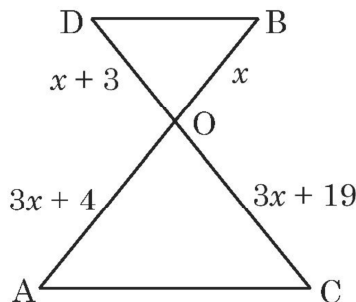
Class	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	100 – 120
Frequency	5	8	10	12	7	8

Section – E

(Case Study based Questions)

Q. No. 36 to 38 are Case Study based questions of 4 marks each.

36. In the figure given below, a folding table is shown :





The legs of the table are represented by line segments AB and CD intersecting at O. Join AC and BD.

Considering table top is parallel to the ground, and $OB = x$, $OD = x + 3$, $OC = 3x + 19$ and $OA = 3x + 4$, answer the following questions :

- (i) Prove that ΔOAC is similar to ΔOBD . 1
- (ii) Prove that $\frac{OA}{AC} = \frac{OB}{BD}$. 1
- (iii) (a) Observe the figure and find the value of x . Hence, find the length of OC. 2

OR

- (iii) (b) Observe the figure and find $\frac{BD}{AC}$. 2

37. While preparing for a competitive examination, Akbar came across a match-stick pattern based question. The pattern is given below :

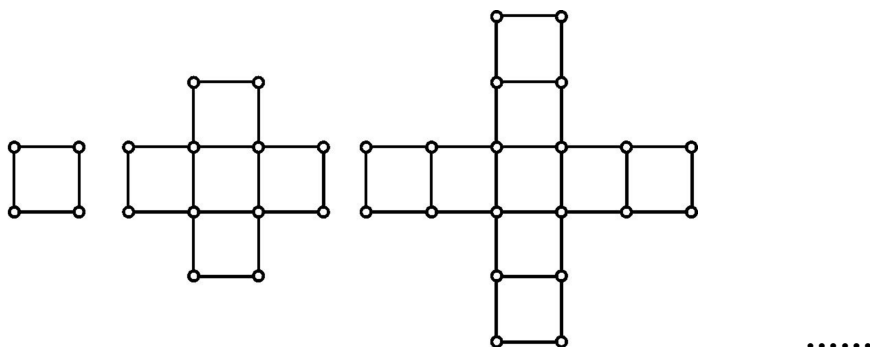


Fig. (1) Fig. (2)

Fig. (3)

Based on the above information, answer the following questions :

- (i) Write first term and common difference of the A.P. formed by number of squares in each figure. 1
- (ii) Write first term and common difference of the A.P. formed by number of sticks used in each figure. 1
- (iii) (a) How many squares are there in Fig. (10) ? Also, write the number of sticks used in Fig. (10). 2

OR

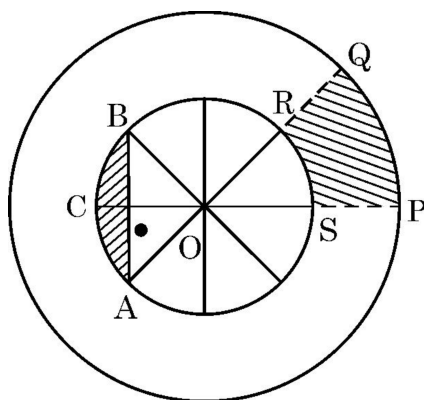
- (iii) (b) If 88 sticks are used to make m^{th} figure (Fig. (m)), find the value of m . How many squares are formed in this figure ? 2



38. NSS (National Service Scheme) aims to connect the students to the community and to involve them in problem solving process.

NSS symbol is based on the 'Rath' wheel of the Konark Sun Temple situated in Odisha. The wheel signifies the progress cycle of life.

The diagrammatic representation of the symbol is given below :



Observe the figure given above. The diameters of inner circle are equally placed. Given that $OP = 21$ cm, $OS = 10$ cm.

Based on the above information, answer the following questions :

- | | |
|---|---|
| (i) Find $m\angle ROS$. | 1 |
| (ii) Find the perimeter of sector OPQ . | 1 |
| (iii) (a) Find the area of shaded region $PQRS$. | 2 |

OR

- | | |
|---|---|
| (iii) (b) Find the area of shaded region ACB i.e. the segment ACB . | 2 |
|---|---|

