

Series C5ABD/5

SET-1

रोल नं.

Roll No.

1 4 2 8 5 9 5 4

प्रश्न-पत्र कोड

Q.P. Code

30/5/1

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 :

- (i) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 23 हैं।
Please check that this question paper contains 23 printed pages.
- (ii) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 38 प्रश्न हैं।
Please check that this question paper contains 38 questions.
- (iii) 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.
- (iv) 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.
- (v) 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 (मानक)

MATHEMATICS (STANDARD)



निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

18-30/5/1

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. $20 \times 1 = 20$

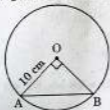
1. The next (4^{th}) term of the A.P. $\sqrt{18}$, $\sqrt{50}$, $\sqrt{98}$, ... is :
(A) $\sqrt{128}$ (B) $\sqrt{140}$
(C) $\sqrt{162}$ (D) $\sqrt{200}$
2. If $\frac{x}{3} = 2 \sin A$, $\frac{y}{3} = 2 \cos A$, then the value of $x^2 + y^2$ is :
(A) 36 (B) 9
(C) 6 (D) 18



3. If $4 \sec \theta - 5 = 0$, then the value of $\cot \theta$ is :
- (A) $\frac{3}{4}$ (B) $\frac{4}{5}$
(C) $\frac{5}{3}$ (D) $\frac{4}{3}$
4. Which out of the following type of straight lines will be represented by the system of equations $3x + 4y = 5$ and $6x + 8y = 7$?
- (A) Parallel
(B) Intersecting
(C) Coincident
(D) Perpendicular to each other
5. The ratio of the sum and product of the roots of the quadratic equation $5x^2 - 6x + 21 = 0$ is :
- (A) 5 : 21 (B) 2 : 7
(C) 21 : 5 (D) 7 : 2
6. For the data 2, 9, $x + 6$, $2x + 3$, 5, 10, 5; if the mean is 7, then the value of x is :
- (A) 9 (B) 6
(C) 5 (D) 3
7. One ticket is drawn at random from a bag containing tickets numbered 1 to 40. The probability that the selected ticket has a number which is a multiple of 7 is :
- (A) $\frac{1}{7}$ (B) $\frac{1}{8}$
(C) $\frac{1}{5}$ (D) $\frac{7}{40}$
8. The perimeter of the sector of a circle of radius 21 cm which subtends an angle of 60° at the centre of circle, is :
- (A) 22 cm (B) 43 cm
(C) 64 cm (D) 462 cm



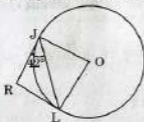
9. The length of an arc of a circle with radius 12 cm is 10π cm. The angle subtended by the arc at the centre of the circle, is :
- (A) 120° (B) 6°
(C) 75° (D) 150°
10. The greatest number which divides 281 and 1249, leaving remainder 5 and 7 respectively, is :
- (A) 23 (B) 276
(C) 138 (D) 69
11. The number of terms in the A.P. 3, 6, 9, 12, ..., 111 is :
- (A) 36 (B) 40
(C) 37 (D) 30
12. A chord of a circle of radius 10 cm subtends a right angle at its centre. The length of the chord (in cm) is :



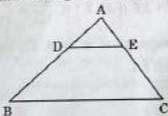
- (A) $5\sqrt{2}$ (B) $10\sqrt{2}$
(C) $\frac{5}{\sqrt{2}}$ (D) 5
13. The LCM of three numbers 28, 44, 132 is :
- (A) 258 (B) 231
(C) 462 (D) 924



14. If the product of two co-prime numbers is 553, then their HCF is :
(A) 1 (B) 553
(C) 7 (D) 79
15. If α and β are the zeroes of the polynomial $p(x) = kx^2 - 30x + 45k$ and $\alpha + \beta = \alpha\beta$, then the value of k is :
(A) $-\frac{2}{3}$ (B) $-\frac{3}{2}$
(C) $\frac{3}{2}$ (D) $\frac{2}{3}$
16. In the given figure, RJ and RL are two tangents to the circle. If $\angle RJL = 42^\circ$, then the measure of $\angle JOL$ is :



- (A) 42° (B) 84°
(C) 96° (D) 138°
17. In the given figure, in $\triangle ABC$, $DE \parallel BC$. If $AD = 2.4$ cm, $DB = 4$ cm and $AE = 2$ cm, then the length of AC is :



- (A) $\frac{10}{3}$ cm (B) $\frac{3}{10}$ cm
(C) $\frac{16}{3}$ cm (D) 1.2 cm



18. If a vertical pole of length 7.5 m casts a shadow 5 m long on the ground and at the same time, a tower casts a shadow 24 m long, then the height of the tower is :
- (A) 20 m (B) 40 m
(C) 60 m (D) 36 m

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): ABCD is a trapezium with $DC \parallel AB$. E and F are points on AD and BC respectively, such that $EF \parallel AB$. Then

$$\frac{AE}{ED} = \frac{BF}{FC}$$

Reason (R): Any line parallel to parallel sides of a trapezium divides the non-parallel sides proportionally.

20. Assertion (A): Degree of a zero polynomial is not defined.

Reason (R): Degree of a non-zero constant polynomial is 0.



SECTION B

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

21. (a) If two tangents inclined at an angle of 60° are drawn to a circle of radius 3 cm, then find the length of each tangent.

OR

- (b) Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

22. Evaluate :

$$\frac{2 \tan 30^\circ \cdot \sec 60^\circ \cdot \tan 45^\circ}{1 - \sin^2 60^\circ}$$

23. If α, β are zeroes of the polynomial $p(x) = 5x^2 - 6x + 1$, then find the value of $\alpha + \beta + \alpha\beta$.

24. (a) Find the ratio in which the point $P(-4, 6)$ divides the line segment joining the points $A(-6, 10)$ and $B(3, -8)$.

OR

- (b) Prove that the points $(3, 0)$, $(6, 4)$ and $(-1, 3)$ are the vertices of an isosceles triangle.

25. A carton consists of 60 shirts of which 48 are good, 8 have major defects and 4 have minor defects. Nigam, a trader, will accept the shirts which are good but Anmol, another trader, will only reject the shirts which have major defects. One shirt is drawn at random from the carton. Find the probability that it is acceptable to Anmol.



SECTION C

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

26. (a) Prove that $\sqrt{3}$ is an irrational number.

OR

- (b) Prove that $(\sqrt{2} + \sqrt{3})^2$ is an irrational number, given that $\sqrt{6}$ is an irrational number.

27. (a) If the sum of the first 14 terms of an A.P. is 1050 and the first term is 10, then find the 20th term and the nth term.

OR

- (b) The first term of an A.P. is 5, the last term is 45 and the sum of all the terms is 400. Find the number of terms and the common difference of the A.P.

28. Prove that the parallelogram circumscribing a circle is a rhombus.

29. Prove that :

$$\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A} = 1 + \sec A \operatorname{cosec} A$$

30. Three unbiased coins are tossed simultaneously. Find the probability of getting :

- (i) at least one head.
- (ii) exactly one tail.
- (iii) two heads and one tail.

31. An arc of a circle of radius 10 cm subtends a right angle at the centre of the circle. Find the area of the corresponding major sector. (Use $\pi = 3.14$)



SECTION D

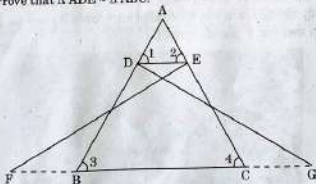
This section comprises Long Answer (LA) type questions of 5 marks each. 4×5=20

32. (a) Find the value of 'k' for which the quadratic equation $(k + 1)x^2 - 6(k + 1)x + 3(k + 9) = 0$, $k \neq -1$ has real and equal roots.

OR

- (b) The age of a man is twice the square of the age of his son. Eight years hence, the age of the man will be 4 years more than three times the age of his son. Find their present ages.
33. From a point on a bridge across the river, the angles of depressions of the banks on opposite sides of the river are 30° and 60° respectively. If the bridge is at a height of 4 m from the banks, find the width of the river.

34. (a) In the given figure, $\triangle FEC \cong \triangle GDB$ and $\angle 1 = \angle 2$.
Prove that $\triangle ADE \sim \triangle ABC$.



OR

- (b) Sides AB and AC and median AD of a $\triangle ABC$ are respectively proportional to sides PQ and PR and median PM of another $\triangle PQR$. Show that $\triangle ABC \sim \triangle PQR$.



35. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in the figure. If the height of the cylinder is 5.8 cm and its base is of radius 2.1 cm, find the total surface area of the article.



SECTION E

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

3×4=12

Case Study - 1

36. Essel World is one of India's largest amusement parks that offers a diverse range of thrilling rides, water attractions and entertainment options for visitors of all ages. The park is known for its iconic "Water Kingdom" section, making it a popular destination for family outings and fun-filled adventure. The ticket charges for the park are ₹ 150 per child and ₹ 250 per adult.



On a day, the cashier of the park found that 300 tickets were sold and an amount of ₹ 55,000 was collected.

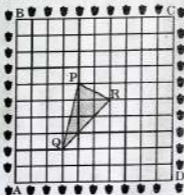


Based on the above, answer the following questions :

- (i) If the number of children visited be x and the number of adults visited be y , then write the given situation algebraically. 1
- (ii) (a) How many children visited the amusement park that day? 2
- OR**
- (b) How many adults visited the amusement park that day? 2
- (iii) How much amount will be collected if 250 children and 100 adults visit the amusement park? 1

Case Study - 2

37. A garden is in the shape of a square. The gardener grew saplings of Ashoka tree on the boundary of the garden, at the distance of 1 m from each other. He wants to decorate the garden with rose plants. He chose a triangular region inside the garden to grow rose plants. In the above situation, the gardener took help from the students of class 10. They made a chart for it which looks like the given figure.

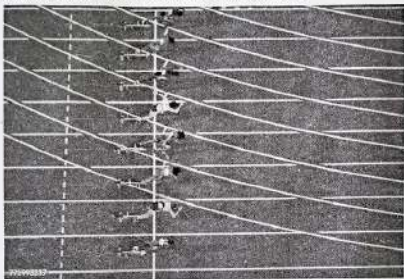


Based on the above, answer the following questions :

- (i) If A is taken as origin, what are the coordinates of the vertices of ΔPQR ? 1
- (ii) (a) Find distances PQ and QR. 2
- OR**
- (b) Find the coordinates of the point which divides the line segment joining points P and R in the ratio 2 : 1 internally. 2
- (iii) Find out if ΔPQR is an isosceles triangle. 1

Case Study - 3

38. Activities like running or cycling reduce stress and the risk of mental disorders like depression. Running helps build endurance. Children develop stronger bones and muscles and are less prone to gain weight. The physical education teacher of a school has decided to conduct an inter school running tournament in his school premises. The time taken by a group of students to run 100 m, was noted as follows :



Time (in seconds)	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
Number of students	8	10	13	6	3

Based on the above, answer the following questions :

- (i) What is the median class of the above given data ? 1
- (ii) (a) Find the mean time taken by the students to finish the race. 2
OR
 (b) Find the mode of the above given data. 2
- (iii) How many students took time less than 60 seconds ? 1