

MATHEMATICS QUESTION PAPER


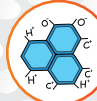


2024



MATHEMATICS

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Series C3ABD/1

SET ~ 1

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प्रश्न-पत्र कोड
Q.P. Code **30/1/1**

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 15 हैं।
Please check that this question paper contains 15 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 minutes 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

C3ABD/1 / 31

Page 1

P.T.O.

General Instructions :

Read the following instructions carefully and 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, Question numbers 1 to 18 are multiple choice questions (MCQs) and question numbers 19 and 20 are Assertion – Reason based questions of 1 mark each.
- (iv) In Section B, Question numbers 21 to 25 are very short answer (VSA) type questions, carrying 2 marks each.
- (v) In Section C, Question numbers 26 to 31 are short answer (SA) type questions, carrying 3 marks each.
- (vi) In Section D, Question numbers 32 to 35 are long answer (LA) type questions carrying 5 marks each.
- (vii) In Section E, Question numbers 36 to 38 are case–study based integrated 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 of 2 marks in Section E.
- (ix) Draw neat diagrams wherever required. Take $\pi = \frac{22}{7}$ wherever required, if not stated.
- (x) Use of calculators is NOT allowed.

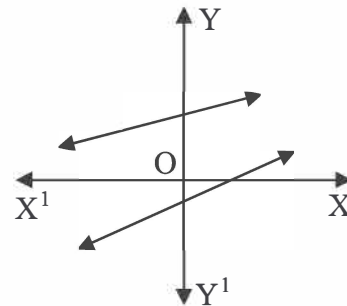
SECTION - A**20×1 = 20**

This section consists of 20 questions of 1 mark each.

1. If the sum of zeroes of the polynomial $p(x) = 2x^2 - k\sqrt{2}x + 1$ is $\sqrt{2}$, then value of k is : 1
 - (a) $\sqrt{2}$ (b) 2 (c) $2\sqrt{2}$ (d) $\frac{1}{2}$
2. If the probability of a player winning a game is 0.79, then the probability of his losing the same game is : 1
 - (a) 1.79 (b) 0.31 (c) 0.21% (d) 0.21
3. If the roots of equation $ax^2 + bx + c = 0$, $a \neq 0$ are real and equal, then which of the following relation is true ? 1
 - (a) $a = \frac{b^2}{c}$ (b) $b^2 = ac$ (c) $ac = \frac{b^2}{4}$ (d) $c = \frac{b^2}{a}$
4. In an A.P., if the first term $a = 7$, n th term $a_n = 84$ and the sum of first n terms $s_n = \frac{2093}{2}$, then n is equal to : 1
 - (a) 22 (b) 24 (c) 23 (d) 26
5. If two positive integers p and q can be expressed as $p = 18a^2b^4$ and $q = 20a^3b^2$, where a and b are prime numbers, then LCM (p, q) is : 1
 - (a) $2a^2b^2$ (b) $180a^2b^2$ (c) $12a^2b^2$ (d) $180a^3b^4$

6. AD is a median of $\triangle ABC$ with vertices A(5, -6), B(6, 4) and C(0, 0). Length AD is equal to : 1
(a) $\sqrt{68}$ units (b) $2\sqrt{15}$ units (c) $\sqrt{101}$ units (d) 10 units
7. If $\sec \theta - \tan \theta = m$, then the value of $\sec \theta + \tan \theta$ is : 1
(a) $1 - \frac{1}{m}$ (b) $m^2 - 1$ (c) $\frac{1}{m}$ (d) $-m$
8. From the data 1, 4, 7, 9, 16, 21, 25, if all the even numbers are removed, then the probability of getting at random a prime number from the remaining is : 1
(a) $\frac{2}{5}$ (b) $\frac{1}{5}$ (c) $\frac{1}{7}$ (d) $\frac{2}{7}$
9. For some data x_1, x_2, \dots, x_n with respective frequencies f_1, f_2, \dots, f_n , the value of $\sum_1^n f_i (x_i - \bar{x})$ is equal to : 1
(a) $n\bar{x}$ (b) 1 (c) $\sum f_i$ (d) 0
10. The zeroes of a polynomial $x^2 + px + q$ are twice the zeroes of the polynomial $4x^2 - 5x - 6$. The value of p is : 1
(a) $-\frac{5}{2}$ (b) $\frac{5}{2}$ (c) -5 (d) 10
11. If the distance between the points (3, -5) and (x, -5) is 15 units, then the values of x are : 1
(a) 12, -18 (b) -12, 18 (c) 18, 5 (d) -9, -12
12. If $\cos(\alpha + \beta) = 0$, then value of $\cos\left(\frac{\alpha + \beta}{2}\right)$ is equal to : 1
(a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{2}$ (c) 0 (d) $\sqrt{2}$
13. A solid sphere is cut into two hemispheres. The ratio of the surface areas of sphere to that of two hemispheres taken together, is : 1
(a) 1 : 1 (b) 1 : 4 (c) 2 : 3 (d) 3 : 2
14. The middle most observation of every data arranged in order is called : 1
(a) mode (b) median (c) mean (d) deviation
15. The volume of the largest right circular cone that can be carved out from a solid cube of edge 2 cm is : 1
(a) $\frac{4\pi}{3}$ cu cm (b) $\frac{5\pi}{3}$ cu cm (c) $\frac{8\pi}{3}$ cu cm (d) $\frac{2\pi}{3}$ cu cm

16. Two dice are rolled together. The probability of getting sum of numbers on the two dice as 2, 3 or 5, is : 1
- (a) $\frac{7}{36}$ (b) $\frac{11}{36}$ (c) $\frac{5}{36}$ (d) $\frac{4}{9}$
17. The centre of a circle is at (2, 0). If one end of a diameter is at (6, 0), then the other end is at : 1
- (a) (0, 0) (b) (4, 0) (c) (-2, 0) (d) (-6, 0)
18. In the given figure, graphs of two linear equations are shown. The pair of these linear equations is : 1
- (a) consistent with unique solution.
 (b) consistent with infinitely many solutions.
 (c) inconsistent.
 (d) inconsistent but can be made consistent by extending these lines.

**Directions :**

In Q. No. 19 and 20 a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

- (a) Both, Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of Assertion (A).
 (b) Both, Assertion (A) and Reason (R) are true but Reason (R) is not correct explanation for 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 tangents drawn at the end points of a diameter of a circle, are parallel. 1
- Reason (R) :** Diameter of a circle is the longest chord.
20. **Assertion (A) :** If the graph of a polynomial touches x -axis at only one point, then the polynomial cannot be a quadratic polynomial.
- Reason (R) :** A polynomial of degree $n(n > 1)$ can have at most n zeroes. 1

SECTION - B

This section consists of 5 questions of 2 marks each.

21. Solve the following system of linear equations
 $7x - 2y = 5$ and $8x + 7y = 15$ and verify your answer. 2

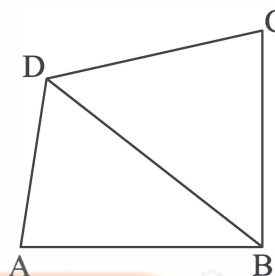
22. In a pack of 52 playing cards one card is lost. From the remaining cards, a card is drawn at random. Find the probability that the drawn card is queen of heart, if the lost card is a black card. 2

23. (A) Evaluate : $2\sqrt{2} \cos 45^\circ \sin 30^\circ + 2\sqrt{3} \cos 30^\circ$ 2

OR

(B) If $A = 60^\circ$ and $B = 30^\circ$, verify that :
 $\sin (A + B) = \sin A \cos B + \cos A \sin B$ 2

24. In the given figure, ABCD is a quadrilateral. Diagonal BD bisects $\angle B$ and $\angle D$ both. Prove that :



(i) $\triangle ABD \sim \triangle CBD$

(ii) $AB = BC$

25. (A) Prove that $5 - 2\sqrt{3}$ is an irrational number. It is given that $\sqrt{3}$ is an irrational number. 2

OR

(B) Show that the number $5 \times 11 \times 17 + 3 \times 11$ is a composite number. 2

SECTION - C

This section consists of 6 questions of 3 marks each.

26. (A) Find the ratio in which the point $\left(\frac{8}{5}, y\right)$ divides the line segment joining the points (1, 2) and (2, 3). Also, find the value of y . 3

OR

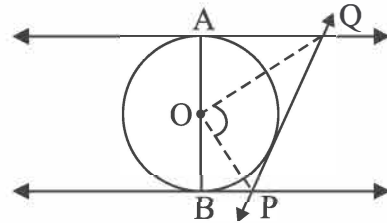
(B) ABCD is a rectangle formed by the points A (-1, -1), B (-1, 6), C (3, 6) and D (3, -1). P, Q, R and S are mid-points of sides AB, BC, CD and DA respectively. Show that diagonals of the quadrilateral PQRS bisect each other. 3

27. In a teachers' workshop, the number of teachers teaching French, Hindi and English are 48, 80 and 144 respectively. Find the minimum number of rooms required if in each room the same number of teachers are seated and all of them are of the same subject. 3

28. Prove that : $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$ 3

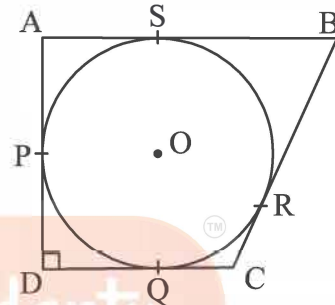
29. Three years ago, Rashmi was thrice as old as Nazma. Ten years later, Rashmi will be twice as old as Nazma. How old are Rashmi and Nazma now ? 3

30. (A) In the given figure, AB is a diameter of the circle with centre O. AQ, BP and PQ are tangents to the circle. Prove that $\angle POQ = 90^\circ$.



OR

(B) A circle with centre O and radius 8 cm is inscribed in a quadrilateral ABCD in which P, Q, R, S are the points of contact as shown. If AD is perpendicular to DC, $BC = 30$ cm and $BS = 24$ cm, then find the length DC.



31. The difference between the outer and inner radii of a hollow right circular cylinder of length 14 cm is 1 cm. If the volume of the metal used in making the cylinder is 176 cm^3 , find the outer and inner radii of the cylinder. 3

SECTION - D

This section consists of 4 questions of 5 marks each.

32. An arc of a circle of radius 21 cm subtends an angle of 60° at the centre. Find : 5

- (i) the length of the arc.
- (ii) the area of the minor segment of the circle made by the corresponding chord.

33. (A) The sum of first and eighth terms of an A.P. is 32 and their product is 60. Find the first term and common difference of the A.P. Hence, also find the sum of its first 20 terms. 5

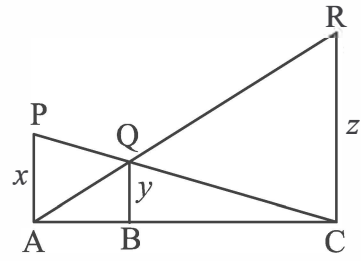
OR

(B) In an A.P. of 40 terms, the sum of first 9 terms is 153 and the sum of last 6 terms is 687. Determine the first term and common difference of A.P. Also, find the sum of all the terms of the A.P. 5

34. (A) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio. 5

OR

(B) In the given figure PA, QB and RC are each perpendicular to AC. If AP = x, BQ = y and CR = z, then prove that $\frac{1}{x} + \frac{1}{z} = \frac{1}{y}$



35. A pole 6m high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point P on the ground is 60° and the angle of depression of the point P from the top of the tower is 45°. Find the height of the tower and the distance of point P from the foot of the tower. (Use $\sqrt{3} = 1.73$) 5

SECTION - E

This section consists of 3 Case-Study Based Questions of 4 marks each.

36. A rectangular floor area can be completely tiled with 200 square tiles. If the side length of each tile is increased by 1 unit, it would take only 128 tiles to cover the floor.



- (i) Assuming the original length of each side of a tile be x units, make a quadratic equation from the above information. 1
- (ii) Write the corresponding quadratic equation in standard form. 1
- (iii) (a) Find the value of x, the length of side of a tile by factorisation. 2

OR

(b) Solve the quadratic equation for x, using quadratic formula. 2

37. BINGO is game of chance. The host has 75 balls numbered 1 through 75. Each player has a BINGO card with some numbers written on it.



The participant cancels the number on the card when called out a number written on the ball selected at random. Whosoever cancels all the numbers on his/her card, says BINGO and wins the game.

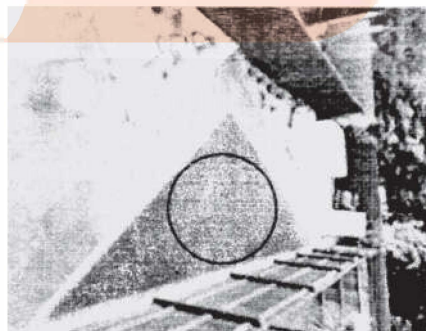
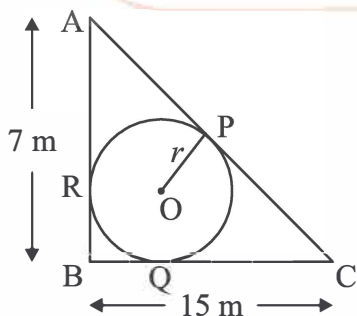
The table given below, shows the data of one such game where 48 balls were used before Tara said 'BINGO'.

Numbers announced	Number of times
0-15	8
15-30	9
30-45	10
45-60	12
60-75	9

Based on the above information, answer the following :

- (i) Write the median class. 1
 - (ii) When first ball was picked up, what was the probability of calling out an even number ? 1
 - (iii) (a) Find median of the given data. 2
- OR**
- (b) Find mode of the given data. 2

38. A backyard is in the shape of a triangle ABC with right angle at B. $AB = 7$ m and $BC = 15$ m. A circular pit was dug inside it such that it touches the walls AC, BC and AB at P, Q and R respectively such that $AP = x$ m.



Based on the above information, answer the following questions :

- (i) Find the length of AR in terms of x . 1
 - (ii) Write the type of quadrilateral BQOR. 1
 - (iii) (a) Find the length PC in terms of x and hence find the value of x . 2
- OR**
- (b) Find x and hence find the radius r of circle. 2



Deeksha's balanced approach to PU and JEE prep, with weekly assessments and dedicated hours, refined my strategy. Supportive teachers and a great learning environment made all the difference.

**P Sai Lekhya Deeksha Vedantu
Vidyanagar 2022-24 (Science)**



Admission to Deeksha was transformative. The VidyaDaan scholarship enabled my PU studies, while my teachers instilled skills in technology and time management. Confident in my preparation, I aim to clear the CA Foundation exam by 2025.

**Shamsudin, Deeksha Vedantu
Kengeri 2022-24 (Comm.)**








With Deeksha's expert guidance, I effectively balanced JEE and PU preparation, achieving a 99.59 percentile in JEE Main. The weekly tests, model papers, and bite-sized materials were instrumental in mastering PU topics and staying exam-ready.

**Neha Prabhu, Deeksha Main
Campus 2022-24 (Science)**



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