



Series CD1BA/3

SET~2

प्रश्न-पत्र कोड
Q.P. Code 30/3/2

रोल नं. Roll No.							
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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 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 (मानक)

MATHEMATICS (Standard)



निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

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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 – Section A, B, C, D and E.
- (iii) In Section–A, questions 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, questions number 21 to 25 are Very Short-Answer (VSA) type questions, carrying 2 marks each.
- (v) In Section–C, questions number 26 to 31 are Short Answer (SA) type questions, carrying 3 marks each.
- (vi) In Section–D, questions number 32 to 35 are Long Answer (LA) type questions, carrying 5 marks each.
- (vii) In Section–E, questions number 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 calculators is not allowed.

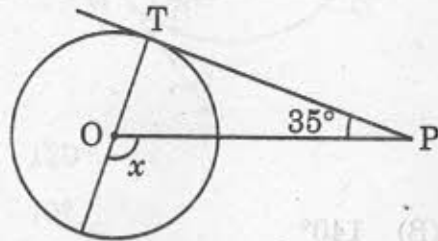


SECTION - A

 $20 \times 1 = 20$

This section consists of 20 questions of 1 mark each.

1. In the given figure, if PT is a tangent to a circle with centre O and $\angle TPO = 35^\circ$, then the measure of $\angle x$ is :



- (A) 110° (B) 115°
(C) 120° (D) 125°

2. The probability of guessing the correct answer to a certain test question is $\frac{x}{6}$. If the probability of not guessing the correct answer to this question is $\frac{2}{3}$, then the value of x is :

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

$$1 - \frac{x}{6} = \frac{2}{3}$$

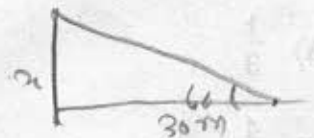
$$\frac{6-x}{6} = \frac{2}{3}$$

$$6-x = 4$$

$$x = 2$$

3. From a point on the ground, which is 30 m away from the foot of a vertical tower, the angle of elevation of the top of the tower is found to be 60° . The height (in metres) of the tower is :

- (A) $10\sqrt{3}$ (B) $30\sqrt{3}$
(C) 60 (D) 30

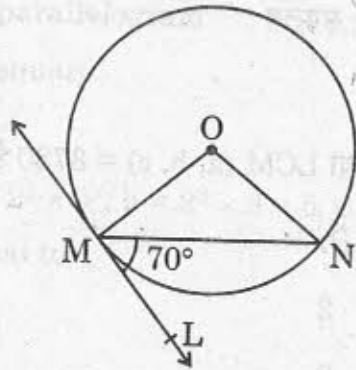


$$\sqrt{3} = \frac{\text{opposite}}{\text{adjacent}} = \frac{x}{30}$$

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4. In the given figure, O is the centre of the circle. MN is the chord and the tangent ML at point M makes an angle of 70° with MN. The measure of $\angle MON$ is :



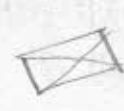
- (A) 120° (B) 140°
(C) 70° (D) 90°
5. If a pair of linear equations in two variables is consistent, then the lines represented by the two equations are :
- (A) always intersecting (B) parallel
(C) always coincident (D) intersecting or coincident
6. If the area of a sector of a circle is $\frac{7}{20}$ of the area of the circle, then the angle at the centre is equal to
- (A) 110° (B) 130°
(C) 100° (D) 126°
7. If a digit is chosen at random from the digits 1, 2, 3, 4, 5, 6, 7, 8, 9; then the probability that this digit is an odd prime number is :
- (A) $\frac{1}{3}$ (B) $\frac{2}{3}$
(C) $\frac{4}{9}$ (D) $\frac{5}{9}$



1493780
14
238
141378127
24
98

8. If the diagonals of a quadrilateral divide each other proportionally, then it is a :

- (A) parallelogram (B) rectangle
(C) square (D) trapezium



9. If $a = 2^2 \times 3^x$, $b = 2^2 \times 3 \times 5$, $c = 2^2 \times 3 \times 7$ and $\text{LCM}(a, b, c) = 3780$, then x is equal to

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

$a = 2^2 \times 3^x$
 $b = 2^2 \times 3 \times 5$
 $c = 2^2 \times 3 \times 7$
 $3780 = 2^2 \times 3^2 \times 5 \times 7$
 $x = 3$
 $3^2 \times 140 = 3780$

10. Two coins are tossed simultaneously. The probability of getting at most one tail is :

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

eg HH, HT, TH, TT
1
1
1
1
0, 1, 0, 1

11. If the mean of five observations $x, x + 2, x + 4, x + 6$ and $x + 8$ is 11, then the value of x is :

- (A) 4 (B) 7
(C) 11 (D) 6

$\frac{5x+30}{5} = 11$
 $5x + 30 = 55$
 $5x = 25$
 $x = 5$

12. The zeroes of the quadratic polynomial $2x^2 - 3x - 9$ are :

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

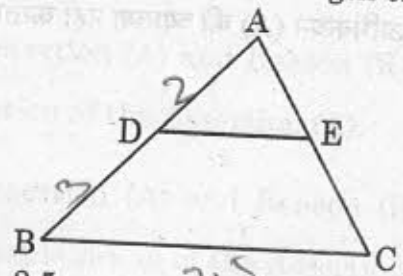
$2x^2 - 3x - 9 = 0$
 $2x^2 - 6x + 3x - 9 = 0$
 $2x(x-3) + 3(x-3) = 0$
 $(x-3)(2x+3) = 0$
 $x = 3, -\frac{3}{2}$



13. Maximum number of common tangents that can be drawn to two circles intersecting at two distinct points is :
- (A) 4 (B) 3
(C) 2 (D) 1



14. In ΔABC , $DE \parallel BC$ (as shown in the figure). If $AD = 2$ cm, $BD = 3$ cm, $BC = 7.5$ cm, then the length of DE (in cm) is :



$\frac{2}{5} = \frac{x}{7.5}$
 $x = 3$

- (A) 2.5 (B) 3
(C) 5 (D) 6

15. If $\cos \theta = \frac{\sqrt{3}}{2}$ and $\sin \phi = \frac{1}{2}$, then $\tan(\theta + \phi)$ is :

- (A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$
(C) 1 (D) not defined

16. Given $HCF(2520, 6600) = 40$, $LCM(2520, 6600) = 252 \times k$, then the value of k is :

- (A) 1650 (B) 1600
(C) 165 (D) 1625

17. If the sum of first n terms of an A.P. is $3n^2 + 4n$ and its common difference is 6, then its first term is :

- (A) 7 (B) 4
(C) 6 (D) 3

18. What should be subtracted from the polynomial $x^2 - 16x + 30$, so that 15 is the zero of the resulting polynomial ?

- (A) 30 (B) 14
(C) 15 (D) 16

$225 - 240 + 30 = 15$



Directions : Questions number 19 and 20 are Assertion and Reason based questions carrying 1 mark each. 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 the Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the 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) :** In a cricket match, a batsman hits a boundary 9 times out of 45 balls he plays. The probability that in a given ball, he does not hit the boundary is $\frac{4}{5}$.

Reason (R) : $P(E) + P(\text{not } E) = 1$

20. **Assertion (A) :** The point which divides the line segment joining the points A (1, 2) and B(-1, 1) internally in the ratio 1 : 2 is $(\frac{-1}{3}, \frac{5}{3})$

Reason (R) : The coordinates of the point which divides the line segment joining the points A (x_1, y_1) and B(x_2, y_2) in the ratio $m_1 : m_2$ are

$$\left(\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right)$$

Handwritten notes:
 1 - $\frac{1}{5} = \frac{26}{25}$
 1 - $\frac{1}{5} = \frac{26}{25}$
 (1, 2) ———— 2 ———— (-1, 1)
 $\frac{-1+2}{2} = \frac{1}{2}$, $\frac{1+2}{3} = \frac{3}{3}$
 (x, y)
 $\text{Point} = \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2}$



SECTION - B

This section consists of 5 questions of 2 marks each.

21. Evaluate : $\frac{\sec^2 45^\circ - \tan^2 45^\circ}{\sin^2 45^\circ}$ 2

22. (a) Find a relation between x and y such that the point $P(x, y)$ is equidistant from the points $A(7, 1)$ and $B(3, 5)$. 2

OR

- (b) Points $A(-1, y)$ and $B(5, 7)$ lie on a circle with centre $O(2, -3y)$ such that AB is a diameter of the circle. Find the value of y . Also, find the radius of the circle. 2

23. One card is drawn at random from a well shuffled deck of 52 cards. Find the probability that the card drawn

- (i) is queen of hearts;
(ii) is not a jack.

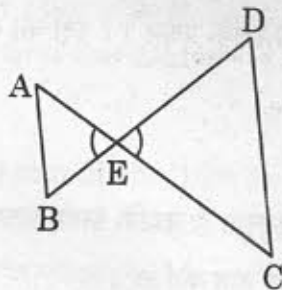
1 + 1

24. (a) If $2x + y = 13$ and $4x - y = 17$, find the value of $(x - y)$. 2

OR

- (b) Sum of two numbers is 105 and their difference is 45. Find the numbers. 2

25. In the given figure, $\frac{EA}{EC} = \frac{EB}{ED}$, prove that $\triangle EAB \sim \triangle ECD$ 2





SECTION - C

This section consists of 6 questions of 3 marks each.

26. Solve the following system of linear equations graphically : 3

$$x - y + 1 = 0$$

$$x + y = 5$$

27. Prove that $\frac{\sin A + \cos A}{\sin A - \cos A} + \frac{\sin A - \cos A}{\sin A + \cos A} = \frac{2}{2 \sin^2 A - 1}$ 3

28. (a) In what ratio does the X-axis divides the line segment joining the points(2, -3) and (5, 6) ? Also, find the coordinates of the point of intersection. 3

OR

- (b) Find the length of the median AD of ΔABC having vertices A(0, -1), B(2, 1) and C(0, 3). 3

29. Prove that the tangents drawn at the end points of a chord of a circle makes equal angles with the chord. 3

30. Find the zeroes of the quadratic polynomial $x^2 - 15$ and verify the relationship between the zeroes and the coefficients of the polynomial. 3

31. (a) If the sum of first 7 terms of an A.P. is 49 and that of first 17 terms is 289, find the sum of its first 20 terms. 3

OR

- (b) The ratio of the 10th term to its 30th term of an A.P. is 1 : 3 and the sum of its first six terms is 42. Find the first term and the common difference of A.P. 3





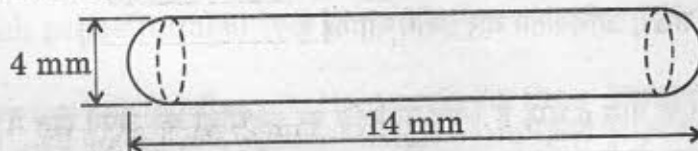
SECTION - D

This section consists of 4 questions of 5 marks each.

32. (a) A solid iron pole consists of a solid cylinder of height 200 cm and base diameter 28 cm, which is surmounted by another cylinder of height 50 cm and radius 7 cm. Find the mass of the pole, given that 1 cm^3 of iron has approximately 8 g mass. 5

OR

- (b) A medicine capsule is in the shape of a cylinder with two hemispheres stuck to each of its ends. The length of the entire capsule is 14 mm and the diameter of the capsule is 4 mm, find its surface area. Also, find its volume. 5



33. (a) In a flight of 2800 km, an aircraft was slowed down due to bad weather. Its average speed is reduced by 100 km/h and by doing so, the time of flight is increased by 30 minutes. Find the original duration of the flight. 5

OR

- (b) The denominator of a fraction is one more than twice the numerator. If the sum of the fraction and its reciprocal is $2\frac{16}{21}$, find the fraction. 5

34. Through the mid-point M of the side CD of a parallelogram ABCD, the line BM is drawn intersecting AC in L and AD produced in E. Prove that $EL = 2BL$. 5

35. The angle of elevation of a jet plane from a point A on the ground is 60° . After a flight of 30 seconds, the angle of elevation changes to 30° . If the jet plane is flying at a constant height of $3600\sqrt{3}$ m, find the speed of the jet plane. 5





SECTION - E

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

36. Teaching Mathematics through activities is a powerful approach that enhances students' understanding and engagement. Keeping this in mind, Ms. Mukta planned a prime number game for class 5 students. She announces the number 2 in her class and asked the first student to multiply it by a prime number and then pass it to second student. Second student also multiplied it by a prime number and passed it to third student. In this way by multiplying to a prime number, the last student got 173250.

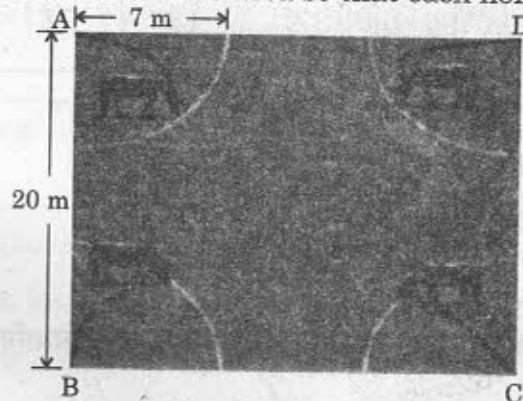
Now, Mukta asked some questions as given below to the students :

- (i) What is the least prime number used by students ? 1
(ii) (a) How many students are in the class ? 2

OR

- (b) What is the highest prime number used by students ? 2
(iii) Which prime number has been used maximum times ? 1

37. A stable owner has four horses. He usually tie these horses with 7 m long rope to pegs at each corner of a square shaped grass field of 20 m length, to graze in his farm. But tying with rope sometimes results in injuries to his horses, so he decided to build fence around the area so that each horse can graze.



Based on the above, answer the following questions :

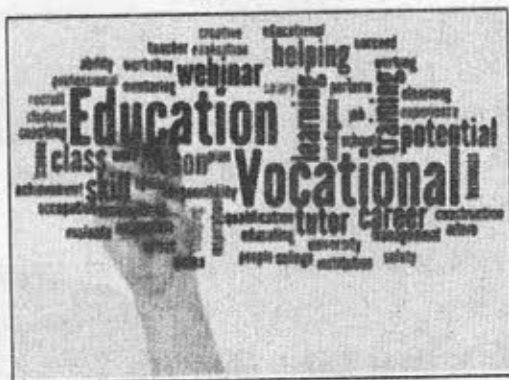
- (i) Find the area of the square shaped grass field. 1
(ii) (a) Find the area of the total field in which these horses can graze. 2

OR

- (b) If the length of the rope of each horse is increased from 7 m to 10 m, find the area grazed by one horse. (Use $\pi = 3.14$) 2
(iii) What is area of the field that is left ungrazed, if the length of the rope of each horse is 7 cm ? 1



38. Vocational training complements traditional education by providing practical skills and hands-on experience. While education equips individuals with a broad knowledge base, vocational training focuses on job-specific skills, enhancing employability thus making the student self-reliant. Keeping this in view, a teacher made the following table giving the frequency distribution of students/adults undergoing vocational training from the training institute.



Age (in years)	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
Number of participants	62	132	96	37	13	11	10	4

From the above answer the following questions :

- (i) What is the lower limit of the modal class of the above data ? 1
- (ii) (a) Find the median class of the above data. 2

OR

- (b) Find the number of participants of age less than 50 years who undergo vocational training. 2
- (iii) Give the empirical relationship between mean, median and mode. 1