



Series CD1BA/3

SET~1

रोल नं. Roll No.							

प्रश्न-पत्र कोड
Q.P. Code **30/3/1**

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 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

30/3/1/CD1BA/22

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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 – **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 × 1 = 20

This section consists of **20** questions of **1** mark each.

1. The pair of linear equations $x + 2y + 5 = 0$ and $-3x = 6y - 1$ has 1
- (A) unique solution (B) exactly two solutions
(C) infinitely many solutions (D) no solution
2. The common difference of the A.P. 1
- $\frac{1}{2x}, \frac{1-4x}{2x}, \frac{1-8x}{2x}, \dots$ is :
- (A) $-2x$ (B) -2
(C) 2 (D) $2x$
3. Two dice are thrown together. The probability that they show different numbers is : 1
- (A) $1/6$ (B) $5/6$
(C) $1/3$ (D) $2/3$
4. 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 : 1
- (A) 2 (B) 3
(C) 4 (D) 6



5. यदि $a = 2^2 \times 3^x$, $b = 2^2 \times 3 \times 5$, $c = 2^2 \times 3 \times 7$ तथा $\text{LCM}(a, b, c) = 3780$ है, तो x का मान है : 1
- (A) 1 (B) 2
(C) 3 (D) 0
6. द्विघात बहुपद $2x^2 - 3x - 9$ के शून्यक हैं : 1
- (A) $3, \frac{-3}{2}$ (B) $-3, \frac{-3}{2}$
(C) $-3, \frac{3}{2}$ (D) $3, \frac{3}{2}$
7. भूमि पर स्थित एक बिंदु, जो एक सीधी खड़ी मीनार के पाद से 30 m की दूरी पर है, से मीनार के शिखर का उन्नयन कोण 60° है, तो मीनार की ऊँचाई (मीटरों में) है : 1
- (A) $10\sqrt{3}$ (B) $30\sqrt{3}$
(C) 60 (D) 30
8. यदि $\cos \theta = \frac{\sqrt{3}}{2}$ तथा $\sin \phi = \frac{1}{2}$ है, तो $\tan(\theta + \phi)$ है : 1
- (A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$
(C) 1 (D) परिभाषित नहीं
9. दो अलग-अलग बिंदुओं पर प्रतिच्छेद करने वाले दो वृत्तों पर खींची जा सकने वाली उभयनिष्ठ स्पर्श-रेखाओं की अधिकतम संख्या है : 1
- (A) 4 (B) 3
(C) 2 (D) 1

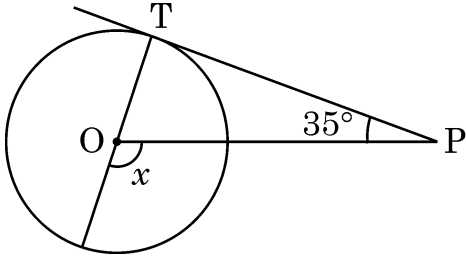


5. If $a = 2^2 \times 3^x$, $b = 2^2 \times 3 \times 5$, $c = 2^2 \times 3 \times 7$ and $\text{LCM}(a, b, c) = 3780$, then x is equal to 1
- (A) 1 (B) 2
(C) 3 (D) 0
6. The zeroes of the quadratic polynomial $2x^2 - 3x - 9$ are : 1
- (A) $3, \frac{-3}{2}$ (B) $-3, \frac{-3}{2}$
(C) $-3, \frac{3}{2}$ (D) $3, \frac{3}{2}$
7. 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 : 1
- (A) $10\sqrt{3}$ (B) $30\sqrt{3}$
(C) 60 (D) 30
8. If $\cos \theta = \frac{\sqrt{3}}{2}$ and $\sin \phi = \frac{1}{2}$, then $\tan(\theta + \phi)$ is : 1
- (A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$
(C) 1 (D) not defined
9. Maximum number of common tangents that can be drawn to two circles intersecting at two distinct points is : 1
- (A) 4 (B) 3
(C) 2 (D) 1



10. दी गई आकृति में, केंद्र O वाले वृत्त की एक स्पर्श-रेखा PT यदि इस प्रकार है कि $\angle TPO = 35^\circ$, तो $\angle x$ की माप है :

1



- (A) 110° (B) 115°
(C) 120° (D) 125°

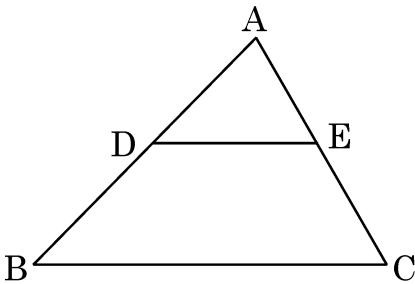
11. यदि एक चतुर्भुज के विकर्ण एक दूसरे को समानुपात में विभाजित करते हैं, तो यह चतुर्भुज है :

1

- (A) समांतर चतुर्भुज (B) आयत
(C) वर्ग (D) समलंब

12. दी गई आकृति में, $\triangle ABC$ में $DE \parallel BC$ है। यदि $AD = 2$ cm, $BD = 3$ cm तथा $BC = 7.5$ cm है, तो DE की लंबाई (cm में) है :

1



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

13. दिया है कि $HCF(2520, 6600) = 40$ तथा $LCM(2520, 6600) = 252 \times k$ है, तो k का मान है :

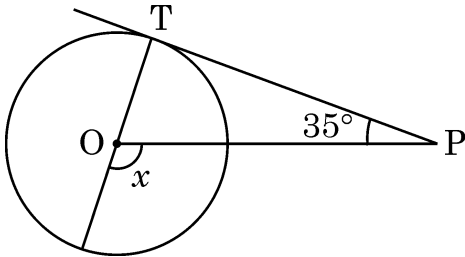
1

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



10. 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 :

1



- (A) 110° (B) 115°
(C) 120° (D) 125°

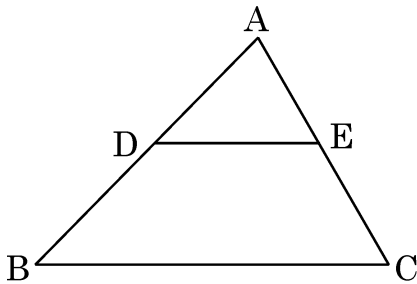
11. If the diagonals of a quadrilateral divide each other proportionally, then it is a :

1

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

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

1



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

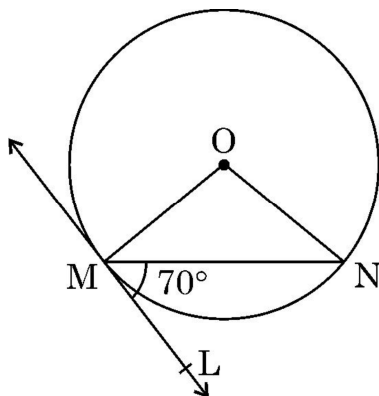
13. Given $\text{HCF}(2520, 6600) = 40$, $\text{LCM}(2520, 6600) = 252 \times k$, then the value of k is :

1

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



14. A pair of irrational numbers whose product is a rational number is : 1
(A) $(\sqrt{16}, \sqrt{4})$ (B) $(\sqrt{5}, \sqrt{2})$
(C) $(\sqrt{3}, \sqrt{27})$ (D) $(\sqrt{36}, \sqrt{2})$
15. 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 : 1
(A) $\frac{1}{3}$ (B) $\frac{2}{3}$
(C) $\frac{4}{9}$ (D) $\frac{5}{9}$
16. The mean of five observations is 15. If the mean of first three observations is 14 and that of the last three observations is 17, then the third observation is 1
(A) 20 (B) 19
(C) 18 (D) 17
17. Perimeter of a sector of a circle whose central angle is 90° and radius 7 cm is : 1
(A) 35 cm (B) 11 cm
(C) 22 cm (D) 25 cm
18. 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 : 1



- (A) 120° (B) 140°
(C) 70° (D) 90°



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

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

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

20. **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 $\frac{4}{5}$. 1

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



SECTION – B

This section consists of 5 questions of 2 marks each.

21. 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

22. (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

23. (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

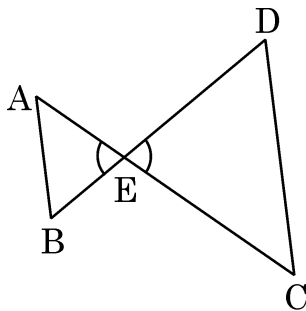
OR

- (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

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

2



25. Evaluate : $\frac{\cos 45^\circ + \sin 60^\circ}{\sec 30^\circ + \operatorname{cosec} 30^\circ}$.

2



SECTION – C

This section consists of **6** questions of **3** marks each.

26. (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**

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

28. Solve the following system of linear equations graphically : **3**

$$x - y + 1 = 0$$

$$x + y = 5$$

29. (a) Find the ratio in which the line segment joining the points (5, 3) and (-1, 6) is divided by Y-axis. **3**

OR

- (b) P(-2, 5) and Q(3, 2) are two points. Find the coordinates of the point R on line segment PQ such that PR = 2QR. **3**

30. Prove that $\frac{\sin \theta - 2 \sin^3 \theta}{2 \cos^3 \theta - \cos \theta} = \tan \theta$. **3**

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



SECTION – D

This section consists of 4 questions of 5 marks each.

32. (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

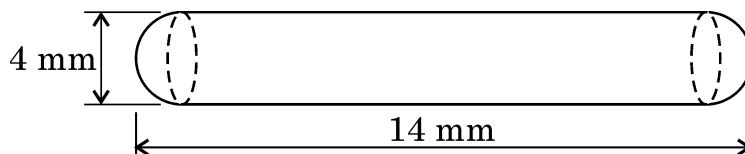
33. State and prove Basic Proportionality theorem. 5

34. From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower. 5

35. (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

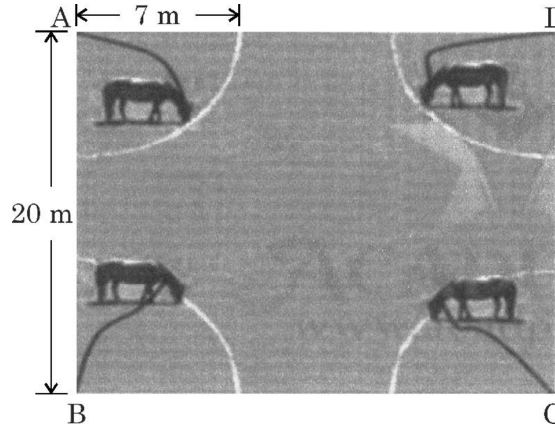




SECTION – E

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

36. 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

37. 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

38. 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

