



Series C3ABD/1

SET ~ 3

रोल नं. Roll No.							

प्रश्न-पत्र कोड
Q.P. Code **30/1/3**

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 15 हैं।
Please check that this question paper contains 15 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 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

**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 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) $180a^3b^4$
2. In an A.P., if the first term (a) = -16 and the common difference (d) = -2 , then the sum of first 10 terms is : **1**
 (a) -200 (b) -70 (c) -250 (d) 250
3. For some data $x_1, x_2, \dots, x_n$ with respective frequencies $f_1, f_2, \dots, f_n$, the value of $\sum_{i=1}^n f_i (x_i - \bar{x})$ is equal to : **1**
 (a) $n\bar{x}$ (b) 1 (c) $\sum f_i$ (d) 0
4. 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



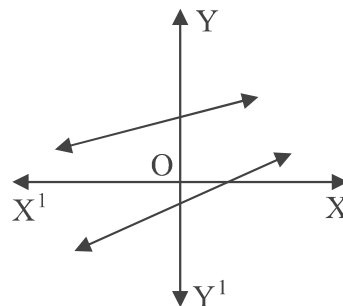
5. A solid sphere is cut into two hemispheres. The ratio of the surface areas of sphere to that of two hemispheres taken together, is : 1
(a) 1 : 1 (b) 1 : 4 (c) 2 : 3 (d) 3 : 2
6. The centre of a circle is at (2, 0). If one end of a diameter is at (6, 0), then the other end is at : 1
(a) (0, 0) (b) (4, 0) (c) (-2, 0) (d) (-6, 0)
7. One card is drawn at random from a well shuffled deck of 52 playing cards. The probability that it is a red ace card, is : 1
(a) $\frac{1}{13}$ (b) $\frac{1}{26}$ (c) $\frac{1}{52}$ (d) $\frac{1}{2}$
8. The middle most observation of every data arranged in order is called : 1
(a) mode (b) median (c) mean (d) deviation
9. For $\theta = 30^\circ$, the value of $(2 \sin \theta \cos \theta)$ is : 1
(a) 1 (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{\sqrt{3}}{4}$ (d) $\frac{3}{2}$
10. 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) $c = \frac{b^2}{a}$
11. 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) $\frac{2}{7}$
12. 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
13. 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) $\frac{4}{9}$
14. 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



15. 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.



16. If α, β are the zeroes of the polynomial $6x^2 - 5x - 4$, then $\frac{1}{\alpha} + \frac{1}{\beta}$ is equal to :

1

- (a) $\frac{5}{4}$ (b) $-\frac{5}{4}$ (c) $\frac{4}{5}$ (d) $\frac{5}{24}$

17. 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) $-m$

18. 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

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.

Reason (R) : Diameter of a circle is the longest chord.

1

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. 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

22. (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

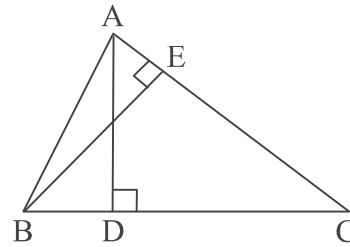
23. (A) Prove that $5 - 2\sqrt{3}$ is an irrational number. It is given that $\sqrt{3}$ is an irrational number. 2

OR

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

24. Solve the following system of linear equations algebraically :
 $2x + 5y = -4$; $4x - 3y = 5$ 2

25. In $\triangle ABC$, altitudes AD and BE are drawn. If $AD = 7$ cm, $BE = 9$ cm and $EC = 12$ cm then, find the length of CD .



2

SECTION - C

This section consists of 6 questions of 3 marks each.

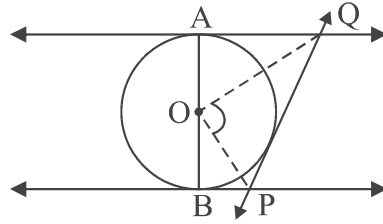
26. The sum of the digits of a 2-digit number is 14. The number obtained by interchanging its digits exceeds the given number by 18. Find the number. 3

27. The inner and outer radii of a hollow cylinder surmounted on a hollow hemisphere of same radii are 3 cm and 4 cm respectively. If height of the cylinder is 14 cm, then find its total surface area (inner and outer). 3

28. 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



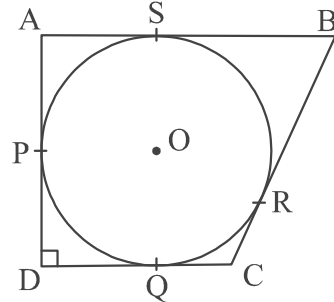
29. (A) In the given figure, AB is a diameter of the circle with centre O. AQ, BP and PQ are tangents to the circle. Prove that $\angle POQ = 90^\circ$.



3

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.



3

30. (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

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

3

SECTION - D

This section consists of 4 questions of 5 marks each.

32. From the top of a 15 m high building, the angle of elevation of the top of a tower is found to be 30° . From the bottom of the same building, the angle of elevation of the top of the tower is found to be 60° . Find the height of the tower and the distance between tower and the building.

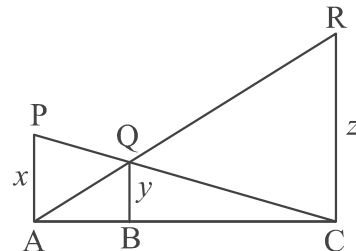
5

33. (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 $\frac{1}{x} + \frac{1}{z} = \frac{1}{y}$



5



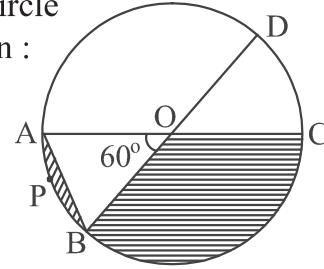
34. (A) The sum of first and eighth terms of an A.P. is 32 and their product is 60. Find the first term and common difference of the A.P. Hence, also find the sum of its first 20 terms. 5

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

35. In the given figure, diameters AC and BD of the circle intersect at O. If $\angle AOB = 60^\circ$ and $OA = 10$ cm, then :

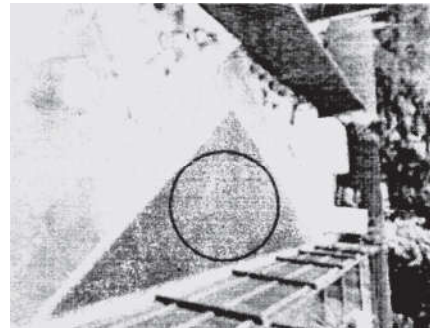
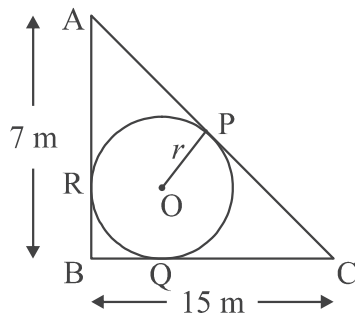
- (i) find the length of the chord AB.
(ii) find the area of shaded region.
(Take $\pi = 3.14$ and $\sqrt{3} = 1.73$)



SECTION - E

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

36. 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 :

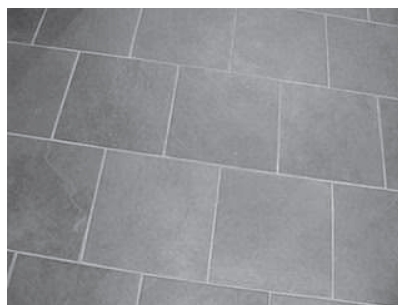
- (i) Find the length of AR in terms of x . 1
(ii) Write the type of quadrilateral BQOR. 1
(iii) (a) Find the length PC in terms of x and hence find the value of x . 2

OR

- (b) Find x and hence find the radius r of circle. 2



37. 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

38. 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

