



Series WX1YZ/4



SET ~ 2

प्रश्न-पत्र कोड
Q.P. Code

30/4/2

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.

गणित (मानक) – सैद्धान्तिक MATHEMATICS (STANDARD) - Theory

#

निर्धारित समय : 3 घण्टे
Time allowed : 3 hours

अधिकतम अंक : 80
Maximum Marks : 80

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.
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को छात्र 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 जाँच कर लें कि इस प्रश्न-पत्र में 38 प्रश्न हैं।
Please check that this question paper contains 38 questions.
- 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 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.

**GENERAL INSTRUCTIONS :**

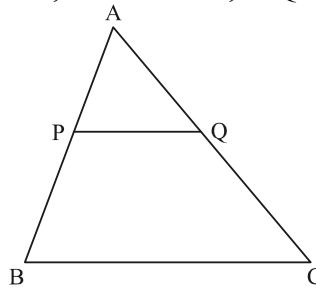
Read the following instructions carefully and follow them :

- (i) This question paper contains **38** questions. **All** questions are compulsory.
- (ii) Question paper is divided into **FIVE** sections – **Section A, B, C, D** and **E**.
- (iii) In **section A** – question number **1** to **18** are multiple choice questions (MCQs) and question number **19** and **20** are Assertion-Reason based questions of **1** mark each.
- (iv) In **section B** – question number **21** to **25** are Very Short Answer (VSA) type questions of **2** marks each.
- (v) In **section C** – question number **26** to **31** are Short Answer (SA) type questions carrying **3** marks each.
- (vi) In **section D** – question number **32** to **35** are Long Answer (LA) type questions carrying **5** marks each.
- (vii) In **section E** – question number **36** to **38** are **case based integrated units** of assessment 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 in Section **E**.
- (ix) Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.
- (x) Use of calculators is **NOT** allowed.

SECTION - A

Section - A consists of Multiple Choice type questions of 1 mark each.

1. Which of the following is true for all values of θ ($0^\circ \leq \theta \leq 90^\circ$) ? **1**
 - (a) $\cos^2 \theta - \sin^2 \theta = 1$
 - (b) $\operatorname{cosec}^2 \theta - \sec^2 \theta = 1$
 - (c) $\sec^2 \theta - \tan^2 \theta = 1$
 - (d) $\cot^2 \theta - \tan^2 \theta = 1$
2. If $k + 2$, $4k - 6$ and $3k - 2$ are three consecutive terms of an A.P., then the value of k is : **1**
 - (a) 3
 - (b) -3
 - (c) 4
 - (d) -4
3. In ΔABC , $PQ \parallel BC$. If $PB = 6$ cm, $AP = 4$ cm, $AQ = 8$ cm, find the length of AC . **1**
 - (a) 12 cm
 - (b) 20 cm
 - (c) 6 cm
 - (d) 14 cm

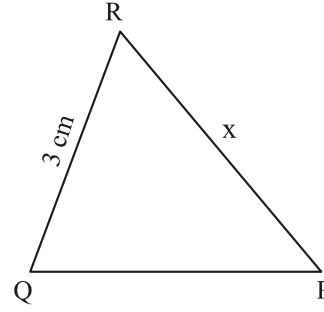
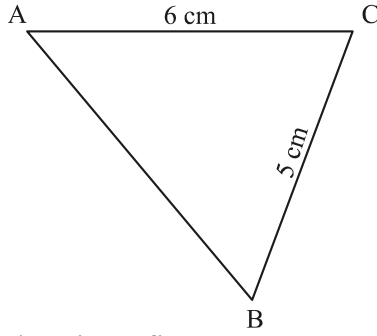


4. The ratio of HCF to LCM of the least composite number and the least prime number is : **1**
 - (a) 1:2
 - (b) 2:1
 - (c) 1:1
 - (d) 1:3
5. A card is drawn at random from a well-shuffled pack of 52 cards. The probability that the card drawn is not an ace is : **1**
 - (a) $\frac{1}{13}$
 - (b) $\frac{9}{13}$
 - (c) $\frac{4}{13}$
 - (d) $\frac{12}{13}$





6.



In the given figure, $\triangle ABC \sim \triangle QPR$. If $AC = 6$ cm, $BC = 5$ cm, $QR = 3$ cm and $PR = x$; then the value of x is :

- (a) 3.6 cm (b) 2.5 cm (c) 10 cm (d) 3.2 cm

1

7. The roots of the equation $x^2 + 3x - 10 = 0$ are :

- (a) 2, -5 (b) -2, 5 (c) 2, 5 (d) -2, -5

1

8. If a pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground, then sun's elevation is :

- (a) 60° (b) 45° (c) 30° (d) 90°

1

9. The distance of the point $(-6, 8)$ from origin is :

- (a) 6 (b) -6 (c) 8 (d) 10

1

10. What is the area of a semi-circle of diameter 'd' ?

- (a) $\frac{1}{16}\pi d^2$ (b) $\frac{1}{4}\pi d^2$ (c) $\frac{1}{8}\pi d^2$ (d) $\frac{1}{2}\pi d^2$

1

11. For the following distribution :

1

Class	0-5	5-10	10-15	15-20	20-25
Frequency	10	15	12	20	9

The sum of lower limits of median class and modal class is :

- (a) 15 (b) 25 (c) 30 (d) 35

12. The length of tangent drawn to a circle of radius 9 cm from a point 41 cm from the centre is :

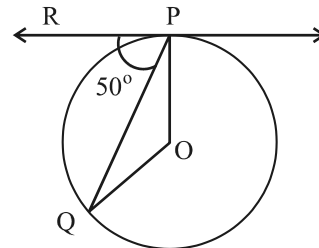
- (a) 40 cm (b) 9 cm (c) 41 cm (d) 50 cm

1

13. In the given figure, O is the centre of the circle and PQ is the chord. If the tangent PR at P makes an angle of 50° with PQ, then the measure of $\angle POQ$ is :

1

- (a) 50°
(b) 40°
(c) 100°
(d) 130°





14. A bag contains 5 red balls and n green balls. If the probability of drawing a green ball is three times that of a red ball, then the value of n is : 1
 (a) 18 (b) 15 (c) 10 (d) 20
15. If α, β are zeroes of the polynomial $x^2 - 1$, then value of $(\alpha + \beta)$ is : 1
 (a) 2 (b) 1 (c) -1 (d) 0
16. If α, β are the zeroes of the polynomial $p(x) = 4x^2 - 3x - 7$, then $\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$ is equal to : 1
 (a) $\frac{7}{3}$ (b) $-\frac{7}{3}$ (c) $\frac{3}{7}$ (d) $-\frac{3}{7}$
17. The pair of linear equations $2x = 5y + 6$ and $15y = 6x - 18$ represents two lines which are : 1
 (a) intersecting (b) parallel
 (c) coincident (d) either intersecting or parallel
18. The distance of the point $(-1, 7)$ from x-axis is : 1
 (a) -1 (b) 7 (c) 6 (d) $\sqrt{50}$

DIRECTIONS : In the question number **19** and **20**, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option out of the following :

19. **Assertion (A) :** a, b, c are in A.P. if and only if $2b = a + c$. 1
Reason (R) : The sum of first n odd natural numbers is n^2 .
 (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 and 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.
20. **Assertion (A) :** The probability that a leap year has 53 Sundays is $\frac{2}{7}$. 1
Reason (R) : The probability that a non-leap year has 53 Sundays is $\frac{5}{7}$.
 (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 and 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.





SECTION – B

Section - B consists of Very Short Answer (VSA) type questions of 2 marks each.

21. (A) Evaluate : $\frac{5}{\cot^2 30^\circ} + \frac{1}{\sin^2 60^\circ} - \cot^2 45^\circ + 2 \sin^2 90^\circ$ 2

OR

(B) If θ is an acute angle and $\sin \theta = \cos \theta$, find the value of $\tan^2 \theta + \cot^2 \theta - 2$. 2

22. If a fair coin is tossed twice, find the probability of getting 'atmost one head'. 2

23. Two numbers are in the ratio 2 : 3 and their LCM is 180. What is the HCF of these numbers ? 2

24. (A) Find the sum and product of the roots of the quadratic equation $2x^2 - 9x + 4 = 0$. 2

OR

(B) Find the discriminant of the quadratic equation $4x^2 - 5 = 0$ and hence comment on the nature of roots of the equation. 2

25. If one zero of the polynomial $p(x) = 6x^2 + 37x - (k - 2)$ is reciprocal of the other, then find the value of k . 2

SECTION – C

Section - C consists of Short Answer (SA) type questions of 3 marks each.

26. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle. 3

27. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line-segment joining the points of contact at the centre. 3

28. Find the value of 'p' for which the quadratic equation $px(x - 2) + 6 = 0$ has two equal real roots. 3

29. (A) The sum of first 15 terms of an A.P. is 750 and its first term is 15. Find its 20th term. 3

OR

(B) Rohan repays his total loan of ₹ 1,18,000 by paying every month starting with the first instalment of ₹ 1,000. If he increases the instalment by ₹ 100 every month, what amount will be paid by him in the 30th instalment ? What amount of loan has he paid after 30th instalment ? 3





30. Prove that $\sqrt{3}$ is an irrational number. 3
31. (A) Prove that $\frac{\sin A - 2 \sin^3 A}{2 \cos^3 A - \cos A} = \tan A$ 3
- OR**
- (B) Prove that $\sec A (1 - \sin A) (\sec A + \tan A) = 1$. 3

SECTION – D

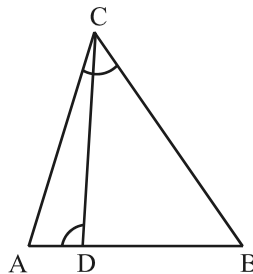
Section – D consists of Long Answer (LA) type questions of 5 marks each.

32. From a solid cylinder of height 20 cm and diameter 12 cm, a conical cavity of height 8 cm and radius 6 cm is hallowed out. Find the total surface area of the remaining solid. 5
33. The monthly expenditure on milk in 200 families of a Housing Society is given below :

Monthly Expenditure (in ₹)	1000-1500	1500-2000	2000-2500	2500-3000	3000-3500	3500-4000	4000-4500	4500-5000
Number of families	24	40	33	x	30	22	16	7

Find the value of x and also, find the median and mean expenditure on milk. 5

34. (A) A straight highway leads to the foot of a tower. A man standing on the top of the 75 m high tower observes two cars at angles of depression of 30° and 60° , which are approaching the foot of the tower. If one car is exactly behind the other on the same side of the tower, find the distance between the two cars. (use $\sqrt{3} = 1.73$) 5
- OR**
- (B) From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 30° . Determine the height of the tower. 5
35. (A) In the given figure, $\angle ADC = \angle BCA$; prove that $\triangle ACB \sim \triangle ADC$. Hence find BD if $AC = 8$ cm and $AD = 3$ cm. 5



OR





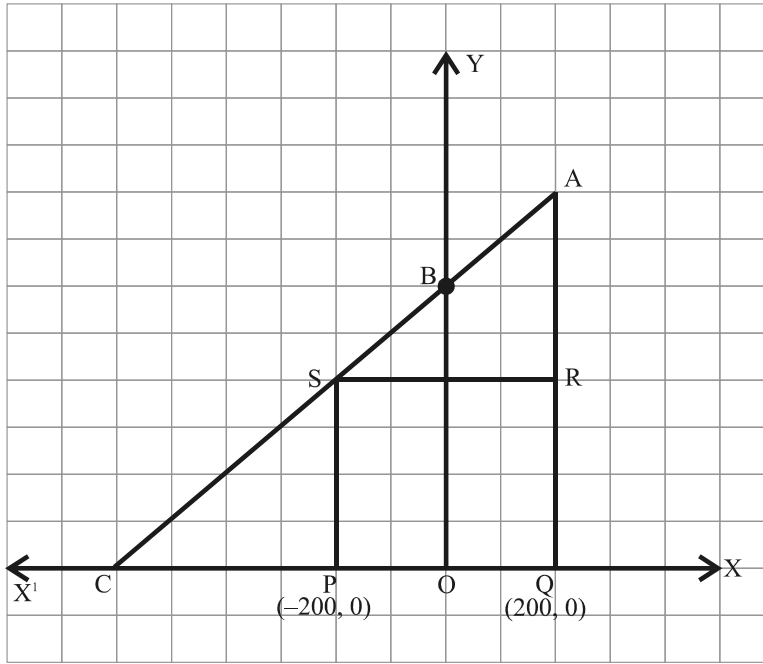
- (B) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.

5

SECTION – E

Section – E consists of three Case Study Based questions of 4 marks each.

36. Jagdish has a field which is in the shape of a right angled triangle AQC. He wants to leave a space in the form of a square PQRS inside the field for growing wheat and the remaining for growing vegetables (as shown in the figure). In the field, there is a pole marked as O.



Based on the above information, answer the following questions :

- (i) Taking O as origin, coordinates of P are $(-200, 0)$ and of Q are $(200, 0)$. PQRS being a square, what are the coordinates of R and S ?

1

- (ii) (a) What is the area of square PQRS ?

2

OR

- (b) What is the length of diagonal PR in square PQRS ?

2

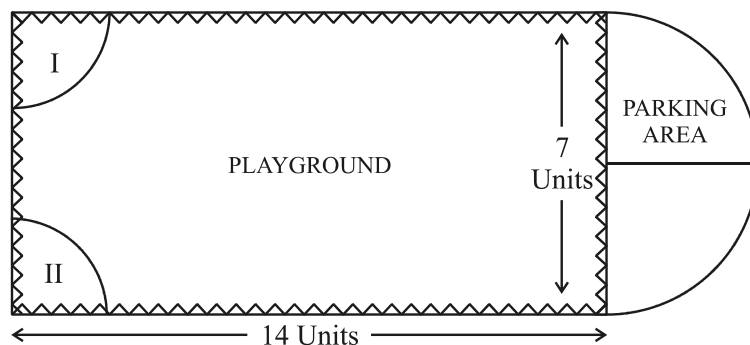
- (iii) If S divides CA in the ratio $K:1$, what is the value of K, where point A is $(200, 800)$?

1





37. Governing council of a local public development authority of Dehradun decided to build an adventurous playground on the top of a hill, which will have adequate space for parking.



After survey, it was decided to build rectangular playground, with a semi-circular area allotted for parking at one end of the playground. The length and breadth of the rectangular playground are 14 units and 7 units, respectively. There are two quadrants of radius 2 units on one side for special seats.

Based on the above information, answer the following questions :

- (i) What is the total perimeter of the parking area ? 1
(ii) (a) What is the total area of parking and the two quadrants ? 2

OR

- (b) What is the ratio of area of playground to the area of parking area ? 2
(iii) Find the cost of fencing the playground and parking area at the rate of ₹ 2 per unit. 1

38. Two schools 'P' and 'Q' decided to award prizes to their students for two games of Hockey ₹ x per student and Cricket ₹ y per student. School 'P' decided to award a total of ₹ 9,500 for the two games to 5 and 4 students respectively; while school 'Q' decided to award ₹ 7,370 for the two games to 4 and 3 students respectively.



Based on the above information, answer the following questions :

- (i) Represent the following information algebraically (in terms of x and y). 1
(ii) (a) What is the prize amount for hockey ? 2

OR

- (b) Prize amount on which game is more and by how much ? 2
(iii) What will be the total prize amount if there are 2 students each from two games ? 1



