

Series : 5LMKN



SET ~ 1



रोल नं.

प्रश्न-पत्र कोड 30/5/1
Q.P. Code

Roll No.

2 1 1 6 7 4 0 5

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) 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.
- (III) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 38 प्रश्न हैं।
Please check that this question paper contains 38 questions.
- (IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में यथा स्थान पर प्रश्न का क्रमांक अवश्य लिखें।
Please write down the Serial Number of the question in the answer-book at the given place 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.

Series : **5LMKN**



SET ~ 1



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परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।

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- (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।

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गणित (मानक)

MATHEMATICS (Standard)

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

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General Instructions :

Read the following instructions very carefully and strictly follow them :

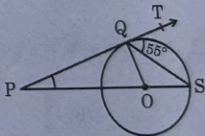
- (i) This question paper contains 38 questions. All questions are **compulsory**.
- (ii) This question paper is divided into **FIVE** Sections – A, B, C, D and E.
- (iii) In Section–A, questions number 1 to 18 are Multiple Choice Questions (MCQs) and questions number 19 and 20 are Assertion-Reason based 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 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 calculator is **NOT** allowed.



SECTION - A

Q. Number 1 to 20 are multiple choice questions of 1 mark each.

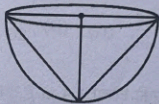
- The value of k for which the equation $kx^2 - 6x - 4 = 0$ has real and equal roots, is
(A) $\frac{9}{4}$ (B) -4
(C) $-\frac{9}{4}$ (D) -2
- The line segment joining the points $P(-4, -2)$ and $Q(10, 4)$ is divided by y -axis in the ratio
(A) $2 : 5$ (B) $1 : 2$
(C) $2 : 1$ (D) $5 : 2$
- If the zeroes of a polynomial $p(x)$ are -3 and 8 , then $p(x)$ equals
(A) $x^2 + 5x - 4$ (B) $(x + 3)(-x + 8)$
(C) $a(x^2 + 5x - 24)$ (D) $x^2 - 24$
- In the given figure, PQ is tangent to the circle with centre O . S is a point on the circle such that $\angle SQT = 55^\circ$. The $m\angle QPS$ is



- (A) 55° (B) 20°
(C) 35° (D) 70°
- Devansh proved that $\triangle ABC \sim \triangle PQR$ using SAS similarity criteria. If he found $\angle C = \angle R$, then which of the following was proved true?
(A) $\frac{AC}{AB} = \frac{PR}{PQ}$ (B) $\frac{BC}{AC} = \frac{PR}{QR}$
(C) $\frac{AC}{BC} = \frac{PR}{PQ}$ (D) $\frac{AC}{BC} = \frac{PR}{QR}$



6. While calculating mean of a grouped frequency distribution, step deviation method was used $\left(\frac{x-a}{h} = u\right)$. It was found that $\bar{x} = 64$, $h = 5$ and $a = 62.5$. The value of $\bar{u}$ is
- (A) 0.5 (B) 1.5
(C) 0.3 (D) 7.5
7. A conical cavity of maximum volume is carved out from a wooden solid hemisphere of radius 10 cm. Curved surface area of the cavity carved out is (use $\pi = 3.14$)



- (A) $314\sqrt{2} \text{ cm}^2$ (B) 314 cm^2
(C) $\frac{3140}{3} \text{ cm}^2$ (D) $3140\sqrt{2} \text{ cm}^2$
8. If a_n represents n^{th} term of the A.P. $-\frac{15}{4}, -\frac{10}{4}, -\frac{5}{4}, \dots$ then value of $a_{16} - a_{12}$ is
- (A) 4 (B) $\frac{5}{4}$
(C) 5 (D) $\frac{25}{4}$
9. The value of p for which roots of the quadratic equation $x^2 - px + 6 = 0$ are rational, is
- (A) 1 (B) -5
(C) 25 (D) $\sqrt{5}$



10. Which of the following can not be the probability of an event ?

(A) $\frac{39}{100}$

(B) $\frac{0.001}{20}$

(C) $\frac{10}{0.2}$

(D) 10%

11. A card is drawn at random from a well shuffled deck of 52 playing cards. The probability that it is either a ten or a king is

(A) $\frac{1}{26}$

(B) $\frac{2}{13}$

(C) $\frac{1}{13}$

(D) $\frac{8}{26}$

12. A camping tent in hemispherical shape of radius 1.4 m, has a door opening of area 0.50 m^2 . Outer surface area of the tent is

(A) 11.78 m^2

(B) 12.32 m^2

(C) 11.82 m^2

(D) 12.86 m^2

13. An arc of length 2.2 cm subtends an angle θ at the centre of the circle with radius 2.8 cm. The value of θ is

(A) 50°

(B) 60°

(C) 45°

(D) 30°

14. For an acute angle θ , if $\sin \theta = \frac{1}{9}$, then value of $\frac{9 \operatorname{cosec} \theta + 1}{9 \operatorname{cosec} \theta - 1}$ is

(A) 0

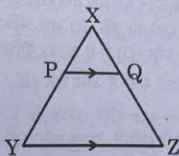
(B) $\frac{80}{81}$

(C) 1

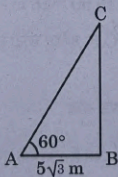
(D) $\frac{82}{80}$



15. In the given figure, $PQ \parallel YZ$ such that $XP : PY = 2 : 3$. If $PQ = 5$ cm, then YZ equals



- (A) 12.5 cm (B) 10 cm
(C) 15 cm (D) 7.5 cm
16. Meena calculates that the probability of her winning the first prize in a lottery is 0.08. If total 800 tickets were sold, the number of tickets bought by her, is
- (A) 64 (B) 640
(C) 100 (D) 10
17. A wire is attached from a point A on the ground to the top of a pole BC, making an angle of elevation as 60° . If $AB = 5\sqrt{3}$ m, then length of the wire is



- (A) 10 m (B) $10\sqrt{3}$ m
(C) 15 m (D) $\frac{5}{2}\sqrt{3}$ m
18. Simplest form of $\frac{\sec A}{\sqrt{\sec^2 A - 1}}$ is
- (A) $\sin A$ (B) $\tan A$
(C) $\operatorname{cosec} A$ (D) $\cos A$



(Assertion and Reason Based Questions)

Directions : Questions number 19 and 20 are Assertion and Reason based questions. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer 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 system of linear equations $3x - 5y + 7 = 0$ and $-6x + 10y + 14 = 0$ is inconsistent.
Reason (R) : When two linear equations don't have unique solution, they always represent parallel lines.
20. **Assertion (A) :** H.C.F. $(36m^2, 18m) = 18m$, where m is a prime number.
Reason (R) : H.C.F. of two numbers is always less than or equal to the smaller number.

SECTION - B

Q. Numbers 21 to 25 are very short answer questions of 2 marks each.

21. Prove that $2 - 5\sqrt{3}$ is an irrational number given that $\sqrt{3}$ is irrational.
22. (a) Vertices of a right triangle ABC with $\angle B = 90^\circ$ are A(3, 4), B(1, 1) and C(-8, 7). Find the value of $\tan A$.

OR

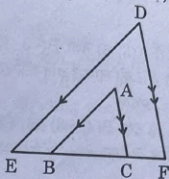
- (b) Using distance formula, prove that the points A(2, 3), B(-7, 0) and C(-1, 2) are collinear.

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23. In the given figure, $AB \parallel DE$ and $AC \parallel DF$. Show that $\triangle ABC \sim \triangle DEF$. If $BC = 10$ cm, $EB = CF = 5$ cm and $AB = 7$ cm, then find the length DE .



24. (a) Evaluate: $\frac{\sin^3 60^\circ - \tan 30^\circ}{\cos^2 45^\circ}$

OR

- (b) For acute angles A and B and $A + 2B$ and $2A + B$ are acute if $\tan(A + 2B) = \sqrt{3}$ and $\sin(2A + B) = \frac{1}{\sqrt{2}}$, then find the measures of angles A and B .
25. A bag contains 25 balls. Some of them are yellow and others are green. One ball is drawn at random. If probability of getting a green ball is $3/5$, then find the number of yellow balls.

SECTION - C

Q. Numbers 26 to 31 are short answer questions of 3 marks each :

26. A circle of diameter 20 cm is equally divided into five sectors. Find the area and perimeter of one of the sectors.
27. (a) In an A.P., 15th term exceeds the 8th term by 21. If sum of first 10 terms is 55, then form the A.P.

OR

- (b) The sum of first n terms of an A.P. is $2n^2 + 13n$. Find its n^{th} term and hence 10th term.



28. Prove that :

$$\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \tan \theta + \cot \theta.$$

29. (a) A circle centered at (2, 1) passes through the points A(5, 6) and B(-3, K). Find the value(s) of K. Hence find length of chord AB.

OR

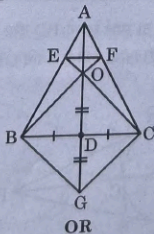
- (b) Prove that the point P dividing the line segment joining the points A(-1, 7) and B(4, -3) in the ratio 3 : 2, lies on the line $x - 3y = -1$. Also find length of PA and PB.

30. Solve the system of linear equations : $x = 4$ and $3x - 2y = 6$ graphically.
31. The dimensions of a window are 156 cm $\times$ 216 cm. Arjun wants to put grill on the window creating complete squares of maximum size. Determine the side length of the square and hence find the number of squares formed.

SECTION - D

Q. numbers 32 to 35 are long answer questions of 5 marks each.

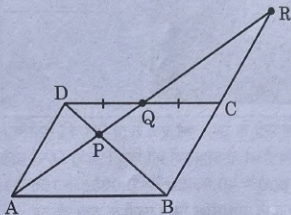
32. Venkat can row a boat in still water at the speed of 12 km/h. He ferries tourists 15 km upstream and 18 km downstream in 3 hours. Find the speed of the stream.
33. (a) D is the mid-point of side BC of $\triangle ABC$. CE and BF intersect at O, a point on AD. AD is produced to G such that OD = DG. Prove that
- (i) OBGC is a parallelogram.
 - (ii) $EF \parallel BC$
 - (iii) $\triangle AEF \sim \triangle ABC$



OR



- (b) Through the mid-point Q of side CD of a parallelogram $ABCD$, the line AR is drawn which intersects BD at P and produced BC at R . Prove that
- (i) $AQ = QR$
 - (ii) $AP = 2PQ$
 - (iii) $PR = 2AP$



34. (a) The mean of the following frequency distribution is 28. If sum of all frequencies is 100, then find the values of p and q :

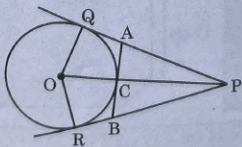
Class Interval	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Frequency	12	p	27	20	q	6

OR

- (b) Find median and mode of the following distribution :

Class Interval	0 - 15	15 - 30	30 - 45	45 - 60	60 - 75	75 - 90	90 - 105
Frequency	15	10	12	9	8	10	6

35. PQ and PR are two tangents to a circle with centre O and radius 5 cm. AB is another tangent to the circle at C which lies on OP . If $OP = 13$ cm, then find the length AB and PA .

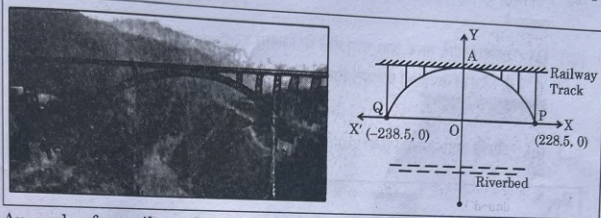




SECTION - E

This section (Q. 36 to 38) has 3 case study based questions of 4 marks each.

36.



An arch of a railway bridge, built on Chenab riverbed, is shown in the above diagram. It is a parabolic arch connecting two hills at P and Q. If the parabolic curve is represented by the polynomial $p(x) = -0.0025x^2 - 0.025x + 136$.

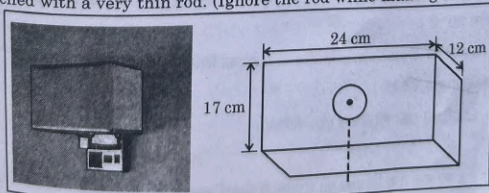
Observe the diagram and based on above information, answer the following questions :

- (i) Write the co-ordinates of point A. 1
- (ii) Find the span of the arch. 1
- (iii) (a) Write the zeroes of the polynomial using diagram and verify the relationship between sum of zeroes and polynomials. 2

OR

- (iii) (b) Find the values of $p(x)$ at $x = 100$ and $x = -100$. Are they same? 2

37. A wall mounted lamp, made of fabric, is shown below. Lamp has cuboidal shape, open from top and bottom. A spherical bulb of diameter 7 cm is latched with a very thin rod. (Ignore the rod while making calculations.)



Dimensions of the cuboid are $24 \text{ cm} \times 12 \text{ cm} \times 17 \text{ cm}$.

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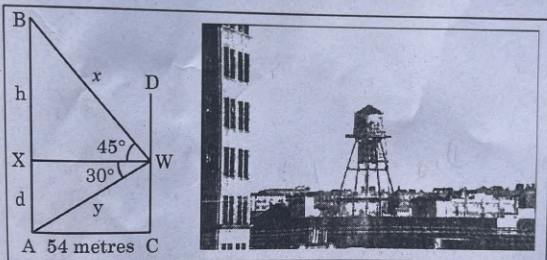


- (i) Find the surface area of the bulb. 1
- (ii) What could be the maximum diameter of the bulb if at least 1 cm space is left from each side? 1
- (iii) (a) Find the area of the fabric used if there is a fold of 2 cm on top and bottom edges. 2

OR

- (iii) (b) Find the space available inside the lamp. 2

38.



Elevated water storage tanks are built to store and supply water to nearby colonies. In the diagram given above, AB is an elevated water tank and CD is a nearby multistorey building. The building is 54 metres away from the water tank.

From a window (W) of the building, the angle of elevation of top of the tank is 45° and angle of depression of its foot is 30° .

- (i) Write a relation between d (the height of window) and y . 1
- (ii) Determine the value of h . 1
- (iii) (a) Determine height of the water tank. 2

OR

- (iii) (b) Find the value of x and height of the window above ground level. 2