Series : L3NMK

SET ~ 1

प्रश्न-पत्र कोड
Q.P. Code 30/3/1

रोल नं.
Roll No. 2013276 6

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 **27** हैं।
Please check that this question paper contains **27** 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

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 no. **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 no. **21** to **25** are very short answer (VSA) type questions, carrying **2** marks each.*

(v) *In **Section C**, Questions no. **26** to **31** are short answer (SA) type questions, carrying **3** marks each.*

(vi) *In **Section D**, Questions no. **32** to **35** are long answer (LA) type questions carrying **5** marks each.*

(vii) *In **Section E**, Questions no. **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 calculator is **not** allowed.*

SECTION A

*This section has **20** Multiple Choice Questions (MCQs) carrying **1** mark each. 20×1=20*

1. The roots of the quadratic equation $(x - 1)^2 = 16$ are :

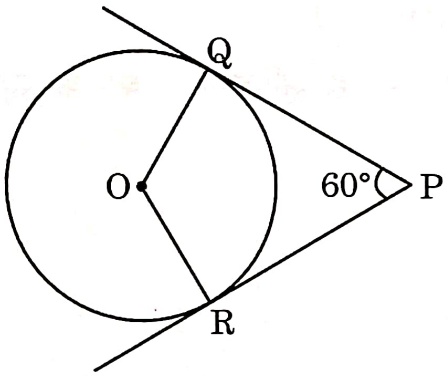
(A) 5, 3

(B) 4, – 4

(C) 5, – 3

(D) – 5, 3

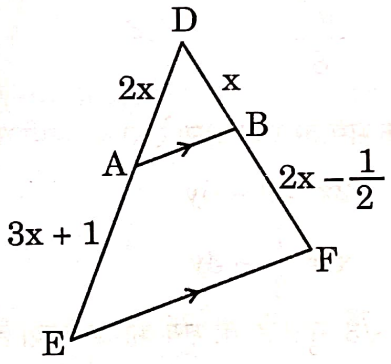
2. In the given figure, PQ and PR are tangents to a circle with centre O and radius 3 cm. If $\angle$ QPR = 60°, then the length of each tangent is :



(A) $3\sqrt{3}$ cm (B) 3 cm

(C) 6 cm (D) $\sqrt{3}$ cm

3. In Δ DEF, AB $\parallel$ EF. The value of x is :



(A) 0, 2 (B) 2 only

(C) – 2 (D) 1

4. $(3 \times 11 \times 13 + 3)$ is :

(A) a prime number (B) divisible by 13

(C) a composite number (D) an odd number

5. Two dice are rolled together. The probability that the sum of the numbers obtained is divisible by 6, is :

(A) $\frac{1}{6}$ (B) $\frac{11}{36}$

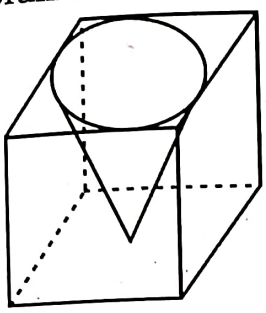
(C) $\frac{1}{12}$ (D) $\frac{1}{4}$

6. The number of multiples of 4 lying between 12 and 250 is :

(A) 59 (B) 59·5

(C) 60 (D) 61

7. A cone of maximum size is carved out from a solid cube of edge length l. The volume of the cone is :



(A) $\frac{\pi l^3}{12}$ (B) $\frac{\pi l^3}{3}$

(C) $l^3\left(1-\frac{\pi}{3}\right)$ (D) $\frac{\pi l^3}{8}$

8. Equation of another line parallel to the line represented by $2x - 6y = 7$ is :

(A) $y = 3x - 7$ (B) $2x = 9 - 6y$

(C) $x - 3y = 7$ (D) $x = \frac{7}{2} - 3y$

9. If the length of the shadow of a tower is $\sqrt{3}$ times that of its height, then altitude of the Sun is :

(A) 45° (B) 30°

(C) 60° (D) 15°

10. If the roots of the quadratic equation $\sqrt{3}x^2 - kx + 2\sqrt{3} = 0$ are real and equal, then the value(s) of k is/are :

(A) $\pm\sqrt{24}$ (B) 0

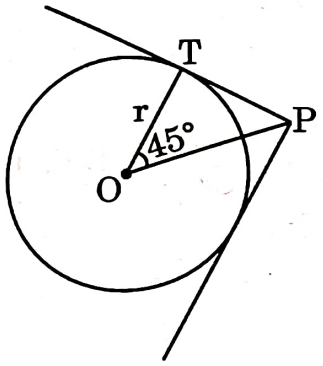
(C) 4 (D) – 5

11. The n^{th} term of the A.P. $\frac{-1}{3}, \frac{2}{3}, \frac{5}{3}, \frac{8}{3}, \ldots$ is :

(A) $3n - 4$ (B) $n - \frac{4}{3}$

(C) $\frac{n-2}{3}$ (D) $\frac{n-4}{3}$

12. In the given figure, PT is a tangent to the circle with centre O and radius r. If $\angle POT = 45°$, then the length of OP is :



(A) $r\sqrt{2}$ (B) $\sqrt{2r}$

(C) $2r$ (D) r^2

13. It is given that $\Delta ABC \sim \Delta QRP$ such that AB = 9 cm, BC = 5 cm and PR = 2 cm. Length of side QR is :

(A) 0·9 cm (B) $\frac{5}{18}$ cm

(C) $\frac{10}{9}$ cm (D) 3·6 cm

14. The sum and product of zeroes of a quadratic polynomial p(x) are $\frac{-1}{3}$ and 2 respectively. The polynomial p(x) is :

(A) $3x^2 - x + 6$

(B) $x^2 + \frac{1}{3}x - 2$

(C) $3x^2 - x + 2$

(D) $-3x^2 - x - 6$

15. Given that $\sin 2\alpha = \frac{\sqrt{3}}{2}$, the value of $\sin 3\alpha$ is :

(A) $\frac{3\sqrt{3}}{4}$ (B) $\frac{1}{2}$

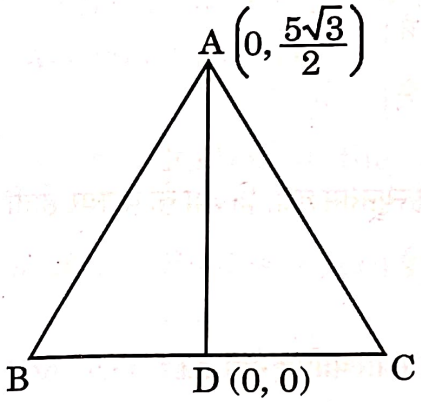
(C) 1 (D) $\frac{\sqrt{3}}{4}$

16. The median and mode of a distribution are 25·2 and 26·1 respectively. The mean of the distribution is :

(A) 24·75 (B) 24·25

(C) 24·3 (D) 25·5

17. In the given figure, Δ ABC is an equilateral triangle. AD is a median of the triangle joining the points $A\left(0, \frac{5\sqrt{3}}{2}\right)$, D(0, 0). Points B and C are (in same order) :



(A) (– 5, 0), (5, 0)

(B) $\left(-\frac{5}{2}, 0\right), \left(\frac{5}{2}, 0\right)$

(C) (– 10, 0), (10, 0)

(D) $(-5\sqrt{3}, 0), (5\sqrt{3}, 0)$

18. The value of $(\frac{1}{2} \tan^2 45° - \cos^2 60°)$ is :

(A) 0

(B) $-\frac{1}{2}$

(C) $\frac{1}{4}$

(D) $-\frac{1}{4}$

Questions number **19** *and* **20** *are Assertion and Reason based questions. 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) :* Radius is the smallest distance of a tangent from the centre of the circle.

Reason (R) : Radius is perpendicular to the tangent.

20. *Assertion (A) :* $\tan 2\theta$ is not defined at $\theta = 45°$.

Reason (R) : $\sin 90° \neq \cos 90°$.

SECTION B

This section has **5** *Very Short Answer (VSA) type questions carrying* **2** *marks each.* *5×2=10*

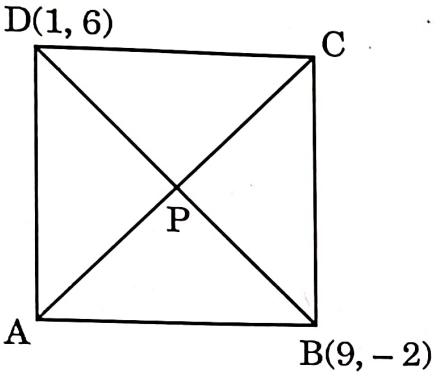
21. Find the length of the plank that can be used to measure the lengths 4 m 20 cm and 5 m 4 cm exactly, in the least time.

22. (a) In an A.P., the first term is 32 and the last term is – 10. If the common difference is – 2, then find the number of terms and their sum.

OR

(b) Find the sum of the first 28 terms of an A.P. whose n^{th} term is given by $a_n = 3n - 2$.

23. (a) Diagonals AC and BD of square ABCD intersect at P. Coordinates of points B and D are (9, – 2) and (1, 6) respectively.



(i) Find the co-ordinates of point P.

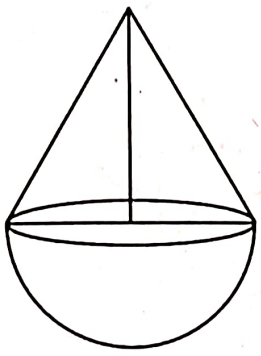
(ii) Find the length of the side of the square.

OR

(b) Find the coordinates of a point on the line $x + y = 5$ which is equidistant from (6, 4) and (5, 2).

24. The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\frac{AO}{OC} = \frac{BO}{OD}$. Show that quadrilateral ABCD is a trapezium.

25. A toy is in the form of a cone mounted on a hemisphere of radius 7 cm. The total height of the toy is 31 cm. Find the total surface area of the toy.



SECTION C

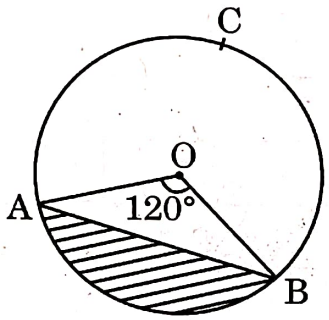
*This section has **6** Short Answer (SA) type questions carrying **3** marks each.* 6×3=18

26. (a) If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that
$\tan\theta + \cot\theta = 1$

OR

(b) Prove that :
$(\sin A + \sec A)^2 + (\cos A + \text{cosec } A)^2 = (1 + \sec A \text{ cosec } A)^2$

27. In the given figure, chord AB subtends an angle of 120° at the centre of the circle with radius 7 cm. Find (i) perimeter of major sector OACB, and (ii) area of the shaded segment, if area of Δ OAB = 21·2 cm^2.



28. Prove that $\sqrt{5}$ is an irrational number.

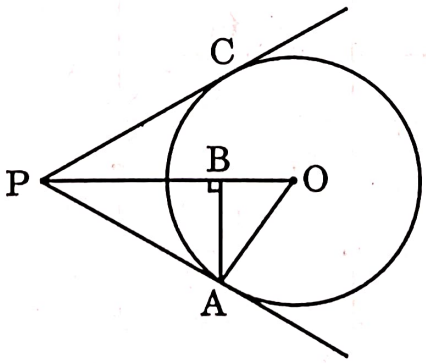
29. Find two consecutive negative integers, sum of whose squares is 481.

30. A point P(x, 7) divides a line segment joining the points A(– 5, 4) and B(7, 9) in a certain ratio. Find the ratio and hence find the value of x.

31. (a) Two tangents PA and PB are drawn to a circle with centre O from an external point P. Prove that $\angle$ APB = 2 $\angle$ OAB.

OR

(b) In the given figure, PA is the tangent to the circle with centre O such that OA = 10 cm, AB = 8 cm and AB $\perp$ OP. Find the length of PB.



SECTION D

*This section has **4** Long Answer (LA) type questions carrying **5** marks each.* $4 \times 5 = 20$

32. (a) The median of the following data is 137. Find the values of x and y, given that total of frequencies is 68.

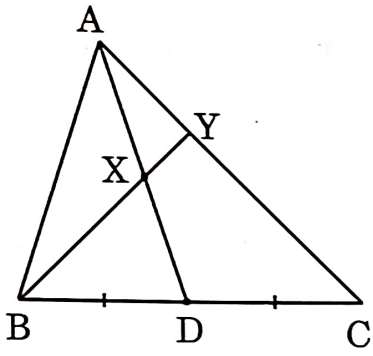
Class	*Frequency*
65 – 85	4
85 – 105	5
105 – 125	x
125 – 145	20
145 – 165	14
165 – 185	y
185 – 205	4

OR

(b) Find mean and mode of the following distribution :

Class	*Frequency*
0 – 10	3
10 – 20	6
20 – 30	11
30 – 40	10
40 – 50	13
50 – 60	3
60 – 70	4

33. In Δ ABC, AD is a median. X is a point on AD such that AX : XD = 2 : 3. BX is extended so that it intersects AC at Y. Prove that BX = 4 XY.



34. (a) Solve the following system of equations graphically :

$x - 2y = 3,\ 3x - 8y = 7$

OR

(b) Five years ago, Adil was thrice as old as Bharat. Ten years later Adil shall be twice as old as Bharat. To know the present ages of Adil and Bharat :

(i) form the linear equations representing the above information.

(ii) show that the system of equations is consistent with unique solution.

(iii) find the present ages of Adil and Bharat.

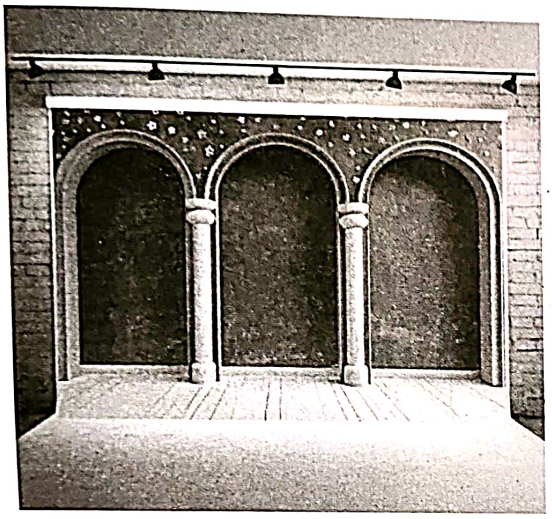
35. A boy standing on a horizontal plane is flying a kite with a string of length 60 m, at an angle of elevation of 30°. Another boy standing on the roof of a 20 m high building, finds the angle of elevation of same kite to be 45°. If both the boys are on opposite sides of the kite, find the distance of the first boy from the base of the building. Also, find the height of the kite from the ground. (Use $\sqrt{3} = 1{\cdot}73$)

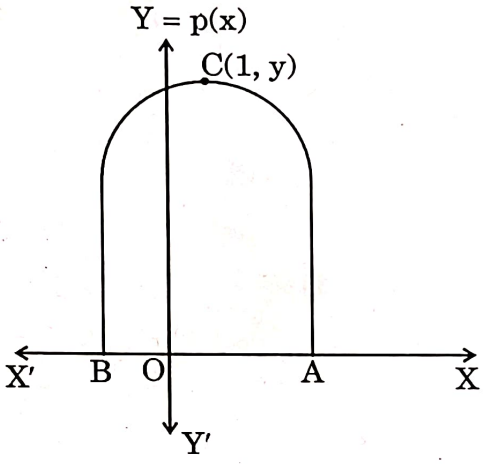
SECTION E

*This section has **3** case study based questions carrying **4** marks each.* $3\times4=12$

Case Study – 1

36. During a theatre drama, a backdrop of building arches was used. The shape of the curve shown below can be represented by the polynomial $p(x) = -x^2 + 2x + 8$, where x is the length (in feet) on stage level.





Based on the figure given above, answer the following questions :

(i) Determine the height of the arch. *1*

(ii) (a) Find zeroes of the polynomial p(x). Which points on the graph represent the zeroes ? *2*

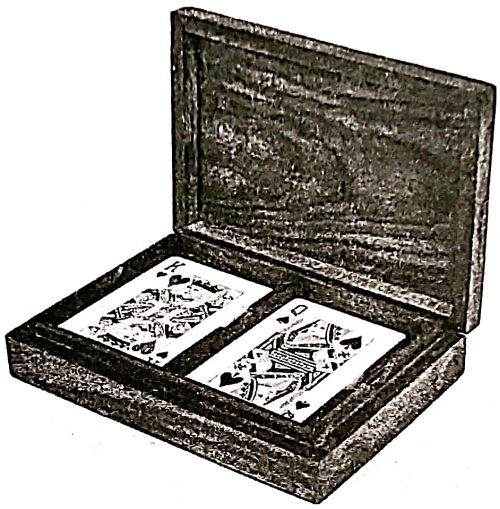
OR

(ii) (b) Find the span of the arch on the stage floor. *2*

(iii) Write the coordinates of the point of intersection of the above curve with the y-axis. *1*

Case Study – 2

37. A group of friends wanted to play cards with two identical packs together. While shuffling the cards, three cards are dropped. Rest of the cards are shuffled and one card is drawn at random. Assuming that the dropped cards were a queen of hearts, a ten of spades and an ace of clubs, answer the following questions :



(i) Find the probability that the drawn card is a face card. *1*

(ii) Find the probability that the drawn card is either a king or a queen. *1*

(iii) (a) Do you think that the probability of getting a queen was higher if none of the cards were dropped ? Justify your answer. *2*

OR

(iii) (b) Find the probability that the drawn card is a jack. Compare it with the probability when none of the cards were dropped. In which case is the probability of getting a jack higher ? *2*

Case Study – 3

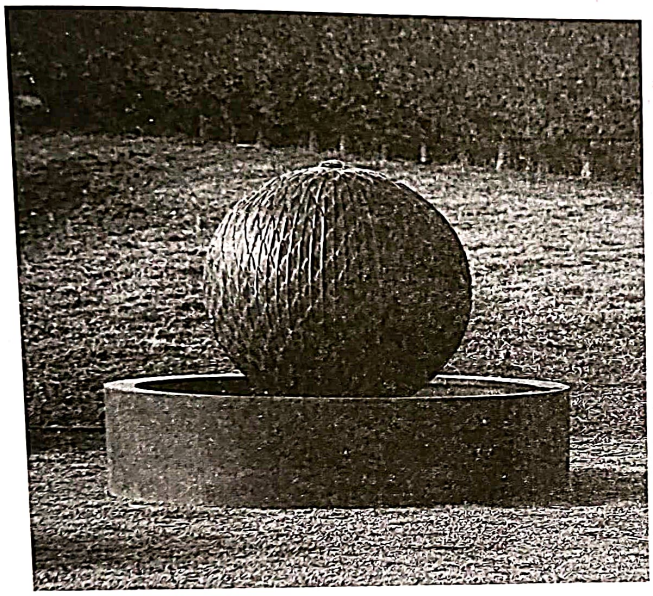
38. A model of Leafy Ball Fountain is made to be kept on the tabletop. Water gently cascades down the ball into a decorative cylindrical pool where it is recycled.

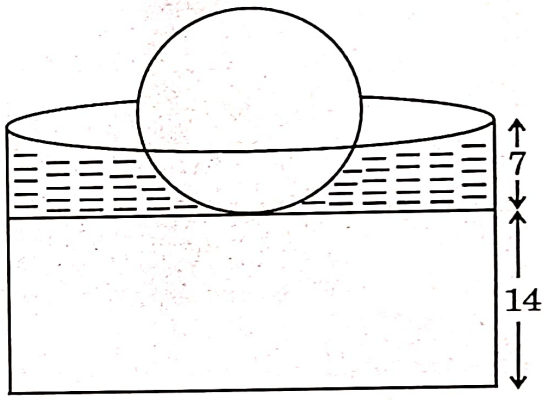
The diameter of spherical ball is 21 cm.

Cylindrical pool – Outer diameter is 50 cm and inner diameter is 40 cm.

Height of solid base is 14 cm.

Height of water filled is 7 cm.





Observe the figure and answer the following questions :

(i) Determine the total height of the fountain. *1*

(ii) Find the volume of the ball. *1*

(iii) (a) If one-third of the ball is submerged in the water, find the volume of the water filled in the pool. *2*

OR

(iii) (b) Find the sum of the outer curved surface area of the cylindrical part and surface area of the ball. *2*