GENERAL INSTRUCTIONS:

(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) 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.

(iv) Draw neat figures wherever required. Take π = 22/7 wherever required if not stated.

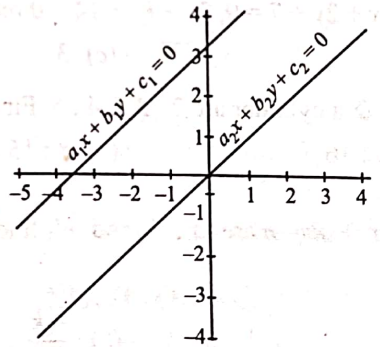
SECTION - A

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

1. An unbiased dice is thrown once. The probability of getting a number between 2 and 6 is

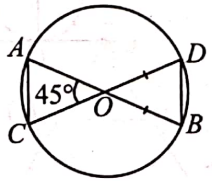
(a) $\frac{1}{2}$ (b) $\frac{2}{5}$ (c) $\frac{1}{3}$ (d) $\frac{2}{3}$

2. The given pair of linear equations in non-intersecting. Which of the following statements is true?



(a) $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$ (b) $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$ (c) $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}=\frac{c_1}{c_2}$ (d) $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$

3. In the given figure, O is the point of intersection of two chords AB and CD such that $OB = OD$ and $\angle AOC = 45°$, then triangles OAC and ODB are



(a) equilateral and similar (b) equilateral but not similar (c) isosceles but not similar (d) isosceles and similar

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4. If 2 is a root of the equation $x^2 + bx + 12 = 0$ and the equation $x^2 + bx + q = 0$ has equal roots, then q is
(a) 8 (b) −16 (c) 16 (d) −8

5. If the length of an arc of a segment of angle 0 in a circle of radius r is π cm and the angle of the segment is 120°, then radius of the circle is:
(a) $\frac{2}{\pi}$ cm (b) 2 cm (c) $\frac{2\pi}{3}$ cm (d) $\frac{3}{2}$ cm

6. The value of x for which $2x$, $(x + 10)$ and $(3x + 2)$ are the three consecutive terms of an AP, is
(a) 6 (b) −6 (c) 18 (d) −18

7. From the top of a building 60m high, the angles of depression of the top and the bottom of a tower are observed to be 30° and 60°. The height of the tower is
(a) 40 m (b) 60 m (c) 45 m (d) 50 m

8. (x, y) is 5 unit from the origin. How many such points lie in the third quadrant?
(a) 0 (b) 1 (c) 2 (d) infinitely many

9. The quadratic equation $ax^2 + 2x + a = 0$ has two equal roots, if
(a) $a = \pm 1$ (b) $a = 0$ (c) $a = 0, 1$ (d) $a = -1, 0$

10. If the LCM of a and 18 is 36 and the HCF of a and 18 is 2, then a is
(a) 1 (b) 2 (c) 4 (d) 3

11. Which of the following is not an irrational number?
(a) x (b) e (c) $\sqrt{5}$ (d) 0

12. Sum of coefficients of x^2, x and constant term in quadratic equation $4x^2 + 3x + 2 = 0$?
(a) 9 (b) 8 (c) 7 (d) 6

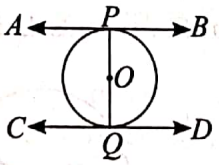
13. Write the nature of the roots of the quadratic equation $6x^2 - 9x - 220$.
(a) No real roots (b) 2 equal real roots (c) 2 distinct real root (d) More than 2 real roots

14. For what value of k will the equations $x + 2y + 7 = 0$, $2x + ky + 14 = 0$ represents coincident lines?
(a) 6 (b) 4 (c) 3 (d) 2

15. The ratios of radius & height of a cone & a cylinder are 2 : 3 & 4 : 5. Find the ratio of their volume.
(a) 16 : 135 (b) 135 : 16 (c) 8 : 15 (d) 15 : 8

16. The zeroes of a polynomial $f(t) = t^3 - kt^2 + mt - n$ are 'a', 'b' and 'c', find the value of $\frac{1}{ca} + \frac{1}{ab} + \frac{1}{bc}$.
(a) $\frac{k}{n}$ (b) $\frac{m}{n}$ (c) $\frac{-k}{n}$ (d) $\frac{-m}{n}$

17. The distance between of two parallel tangents of a circle of radius 5 cm is



(a) 5 cm (b) 12 cm (c) 6 cm (d) 10 cm

18. The distance of the point (–6, 8) from origin is:
(a) 6 (b) −6 (c) 8 (d) 10

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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:

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of (A).

(b) Both Assertion (A) and Reason (R) are true but 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.

19. **Assertion (A):** Product of zeroes of polynomial $x^3 - 3x^2 + 7x - 10$ is 10.

Reason (R): Product of zeroes of polynomial: $ax^3 + bx^2 + cx + d$ is given by $\frac{c}{a}$.

20. **Assertion (A):** 3 is a rational number.

Reason (R): The square roots of all positive integers are irrationals.

SECTION - B

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

21. (a) If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$; $0° < A + B < 90°$; $A > B$, find A and B.

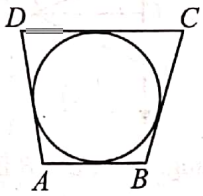
OR

(b) If $m \sin A + n \cos A = p$ and $m \cos A - n \sin A = q$, prove that $m^2 + n^2 = p^2 + q^2$.

22. Find the zeroes of the quadratic polynomial $x^2 + 5x + 6$ and verify the relationship between the zeroes and the coefficients.

23. Prove that a line draw through the mid point of one side of a triangle parallel to another side bisects the third side.

24. (a) In the adjoining figure, a circle touches all the four sides of a quadrilateral $ABCD$ whose sides are $AB = 6$ cm, $BC = 9$ cm and $CD = 8$ cm. Find the length of side AD.



OR

(b) With vertices A, B of ΔABC as centres, arcs are drawn with radius 7 cm & the three portions so obtained arc removed. find the total area removed from the triangle.

25. If θ is a positive acute angle, such that $\text{cosec}\ \theta = \sec 60°$ find the value of $2 \sin^2 \theta - 1$.

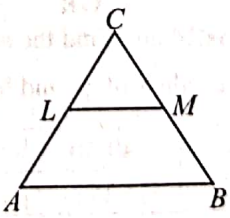
SECTION - C

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

26. (a) P and Q are points on the sides AB and AC respectively of a ΔABC. If $AP = 2$ cm, $PB = 4$ cm, $AQ = 3$ cm and $QC = 6$ cm, show that $BC = 3PQ$.

OR

(b) In Fig. $LM \parallel AB$. If $AL = x - 3$, $AC = 2x$, $BM = x - 2$ and $BC = 2x + 3$, find the value of x.



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27. (*a*) Prove that:

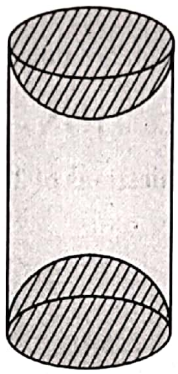
$$\frac{1}{1+\sin^2\theta}+\frac{1}{1+\cos^2\theta}+\frac{1}{1+\sec^2\theta}+\frac{1}{1+\operatorname{cosec}^2\theta}=2$$

OR

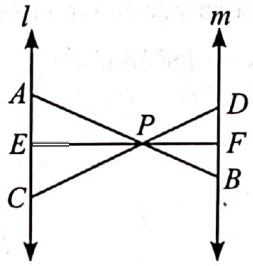
(*b*) If $\tan A = n \tan B$ and $\sin A = m \sin B$, then prove that $\cos^2 A = \frac{m^2-1}{n^2-1}$

28. If $(x-k)$ is the HCF of $(2x^2-kx-9)$ and x^2+x-12, find the value of k.

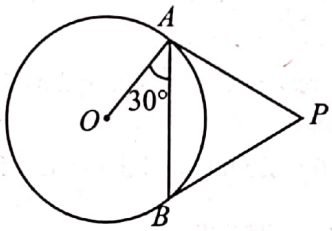
29. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in Fig. If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm, find the total surface area of the article.



30. In the figure, $l \parallel m$ and line segments AB, CD, and EF are concurrent at point P. Prove that $\frac{AE}{BF}=\frac{AC}{BD}=\frac{CE}{FD}$.



31. In the adjoining figure, a circle with centre O tangent PA & PB from an external point P. If $\angle OAB = 30°$, then find. $\angle APB$.



SECTION - D

Section - D consists of Long Answer (LA) type questions of 5 Marks each.

32. (*a*) A chord of a circle of radius 10 cm subtends a right angle at the center. Find the area of the corresponding: (Use $\pi = 3.14$)

(*i*) minor sector (*ii*) major sector (*iii*) minor segment (*iv*) major segment

OR

(*b*) The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.

33. The median of the following data is 50. Find the values of 'p' and 'q', if the sum of all frequencies is 90. Also find the mode.

Marks obtained	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Number of students	p	15	25	20	q	8	10

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34. (*a*) The present age of a father is three years more than three times the age of his son. Three years hence the father's age will be 10 years more than twice the age of the son. Determine their present ages.

OR

(*b*) Solve for y:

$$\frac{y+3}{y-2}-\frac{1-y}{y}=\frac{17}{4}: y \neq 0, 2$$

35. From a deck of 52 playing cards, Jacks & Queens of black colour & Kings & aces of red colour are removed. The remaining cards are mixed & a card is drawn at random. Find the probability that the drawn card is:

(*a*) A black king (*b*) A card of red colour (*c*) A Jack of black colour. (*d*) A face card.

SECTION - E

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

36. Sehaj Batra gets pocket money from his father every day. Out of pocket money, he saves money for poor people in his locality. On 1st day he saves ₹ 27.5 On each succeeding day he increases his saving by ₹ 2.5.

(*i*) Find the amount saved by Sehaj on 10th day. **1**

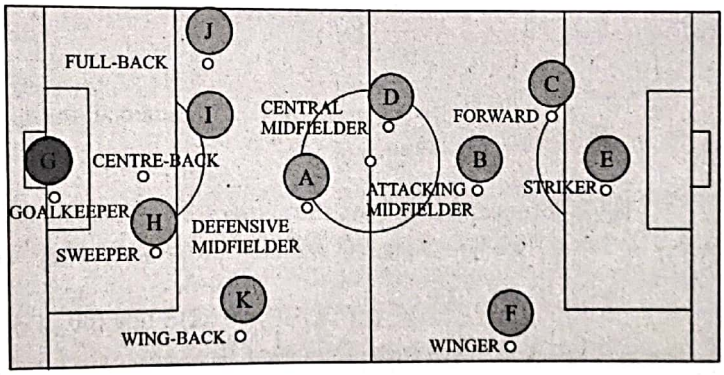
(*ii*) Find the amount saved by Sehaj on 25th day. **2**

OR

Find in how many days Sehaj saves ₹ 1400.

(*iii*) Find the total amount saved by Sehaj in 30 days. **1**

37. Tharunya was thrilled to know that the football tournament is fixed with a monthly timeframe from 20th July to 20th August 2023 and for the first time in the FIFA Women's World Cup's history, two nations host in 10 venues. Her father felt that the game can be better understood if the position of players is represented as points on a coordinate plane.



(*i*) At an instance, the midfielders and forward formed a parallelogram. Find the position of the central midfielder (D) if the position of other players who formed the parallelogram are :- $A(1, 2)$, $B(4, 3)$ and $C(6, 6)$ **1**

(*ii*) Check if the goal keeper $G(-3, 5)$, sweeper $H(3, 1)$ and wing-back $K(0, 3)$ fall on a same straight line. **2**

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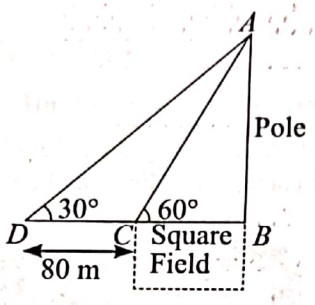
OR

Check if the full-back $J(5, -3)$ and centre-back $I(-4, 6)$ are equidistant from forward $C(0, 1)$ and if C is the mid-point of IJ.

(*iii*) If defensive midfielder $A(1, 4)$, attacking midfielder $B(2, -3)$ and striker $E(a, b)$ lie on the same straight line and B is equidistant from A and E, find the position of E. 1

38. Basant Kumar is a farmer in a remote village of Rajasthan. He has a small square farm land. He wants to do fencing of the land so that stray animals may not enter his farmland. For this, he wants to get the perimeter of the land. There is a pole at one comer of this field. He wants to hang an effigy on the top of it to keep birds away. He standing in one corner of his square field and observes that the angle subtended by the pole in the corner just diagonally opposite to this corner is 60°. When he retires 80 m from the corner, along the same straight line, he finds the angle to be 30°.



(*i*) Find the height of the pole too so that he can arrange a ladder accordingly to put an effigy on the pole. 1

(*ii*) Find the distance from farmer at position C and top of the pole? 2

OR

Find the distance from farmer at position D and top of the pole?

(*iii*) Find the length of his square field so that he can buy material to do the fencing work accordingly. 1

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