

PART : A

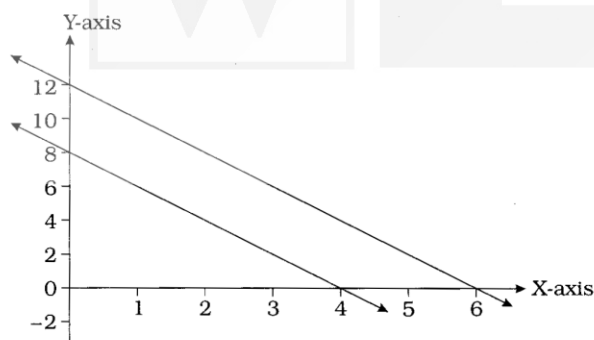
- The cubic polynomial $p(a) = a^3 - a$ has real zeros.
A. 0 ☐ B. 1 ☐ C. 2 ☐ D. 3 ☐
- If one root of equation $x^2 + ax - 8 = 0$ is 4, then $a =$
A. 2 ☐ B. 4 ☐ C. -2 ☐ D. -4 ☐
- If H.C.F. of $(x, y) = 1$, then H.C.F. of $(x - y, x + y) =$
A. 1 or 2 ☐ B. x or y ☐ C. $x + y$ or $x - y$ ☐ D. 4 ☐
- In Euclid's division Lemma, for positive integers a and b the unique integers q and r are obtained such that $a = bq + r$ where
A. $0 < r < b$ ☐ B. $0 \leq r \leq b$ ☐ C. $0 < r \leq b$ ☐ D. $0 \leq r < b$ ☐
- In $\triangle ABC$, $\overline{AD}$ is a median, then as per Apollonius' theorem, is true.
A. $AB^2 + AC^2 = 2(AD^2 + BC^2)$ ☐ B. $AB^2 + AC^2 = 2(BD^2 + DC^2)$ ☐
C. $AB^2 + AC^2 = 2(AD^2 + DC^2)$ ☐ D. $AB^2 + AC^2 = 2(BD^2 + BC^2)$ ☐
- In Mathematics Exam, the probability of Aayushi to score 100 out of 100 is
A. 1 ☐ B. 0 ☐ C. $\frac{1}{100}$ ☐ D. $\frac{1}{101}$ ☐
- The probability of an event K is
A. $0 \geq P(K) \geq 1$ ☐ B. $0 \leq P(K) \leq 1$ ☐
C. $0 > P(K) > 1$ ☐ D. $0 < P(K) < 1$ ☐
- If the die is rolled once, then the probability of having a prime number on the die is
A. $\frac{1}{3}$ ☐ B. $\frac{1}{6}$ ☐ C. $\frac{1}{2}$ ☐ D. 1 ☐
- If $\bar{x} - Z = 3$, $\bar{x} + Z = 45$, then $M =$
A. 22 ☐ B. 23 ☐ C. 24 ☐ D. 26 ☐



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10. Which of the following group is true for $\square ABCD$?
- | | |
|---------------------------------------|---|
| 1. $\square ABCD$ is a rhombus. | a. $\overline{AC}$ and $\overline{BD}$ bisect. |
| 2. $\square ABCD$ is a parallelogram. | b. $\overline{AC}$ and $\overline{BD}$ bisect at right angle. |
| 3. $\square ABCD$ is a rectangle. | c. $\overline{AC}$ and $\overline{BD}$ are congruent and bisect at right angle. |
| 4. $\square ABCD$ is a square. | d. $\overline{AC}$ and $\overline{BD}$ are congruent and bisect. |
- A. (1 - d), (2 - a), (3 - b), (4 - c) ☐ B. (1 - c), (2 - d), (3 - a), (4 - b) ☐
C. (1 - b), (2 - a), (3 - d), (4 - c) ☐ D. (1 - b), (2 - c), (3 - d), (4 - a) ☐
11. When point $A(x_1, y_1)$ and point $B(x_2, y_2)$ are joined to form $\overline{AB}$ and dividing $\overline{AB}$ in the proportion of $\lambda : 1$; the coordinates of point will be
- A. $\left(\frac{\lambda x_2 + x_1}{\lambda + 1}, \frac{\lambda y_2 + y_1}{\lambda + 1}\right)$ ☐ B. $\left(\frac{\lambda x_2 + x_1}{\lambda - 1}, \frac{\lambda y_2 + y_1}{\lambda - 1}\right)$ ☐
C. $\left(\frac{\lambda x_1 + x_2}{\lambda + 1}, \frac{\lambda y_1 + y_2}{\lambda + 1}\right)$ ☐ D. $\left(\frac{\lambda x_1 + x_2}{\lambda - 1}, \frac{\lambda y_1 + y_2}{\lambda - 1}\right)$ ☐
12. One circle touches all the sides of $\square ABCD$. If $AB = 5$, $BC = 8$, $CD = 6$; then $AD = \dots\dots\dots$
- A. 3 ☐ B. 7 ☐ C. 4 ☐ D. 9 ☐
13. Point P lies in the exterior of $\odot(O, 15)$. The tangent drawn from point P touches the circle at T . If $PT = 8$; then $OP = \dots\dots\dots$
- A. 7 ☐ B. 13 ☐ C. 17 ☐ D. 23 ☐
14. The volume of hemisphere having 1 cm diameter will be cm^3 .
- A. $\frac{\pi}{6}$ ☐ B. $\frac{\pi}{12}$ ☐ C. $\frac{2\pi}{3}$ ☐ D. $\frac{4\pi}{3}$ ☐
15. If the frustum of a cone is having 6 cm height and radii 5 cm and 9 cm respectively; then its volume will be cm^3 .
- A. 320π ☐ B. 151π ☐ C. 302π ☐ D. 98π ☐
16. If $2k + 1$, 13, $5k - 3$ are three consecutive terms of an A.P. then $k = \dots\dots\dots$
- A. 17 ☐ B. 13 ☐ C. 4 ☐ D. 9 ☐
17. If the sequence is 1, 1, 2, 3, 5, 8, 13, 21, 34, ... then it is called
- A. Arithmetic Progression. ☐ B. Finite Sequence. ☐
C. Fibonacci Sequence. ☐ D. None of the given three ☐
18. If for an A.P. $S_n = 2n^2 + 3n$, then $d = \dots\dots\dots$
- A. 13 ☐ B. 4 ☐ C. 9 ☐ D. -2 ☐
19. In $\triangle ABC$, the bisector of $\angle A$ intersects $\overline{BC}$ at point D , then
- A. $BD \times AC = BC \times AB$ ☐ B. $BD \times AB = DC \times AC$ ☐
C. $AC \times AB = DC \times BC$ ☐ D. $BD \times AC = DC \times AB$ ☐
20. In $\triangle ABC$, the measures of $\overline{BC}$, $\overline{CA}$ and $\overline{AB}$ are in 3 : 4 : 5 proportion. Correspondence $ABC \leftrightarrow PQR$ is a similarity. If $PR = 12$, then perimeter of $\triangle PQR$ is
- A. 12 ☐ B. 24 ☐ C. 27 ☐ D. 36 ☐
21. Out of the following triplets, is not a Pythagorean triplet.
- A. 7, 24, 25 ☐ B. 20, 21, 29 ☐
C. 11, 60, 61 ☐ D. 13, 35, 37 ☐

22. If the radius of a circle is increased by 10 %, then the corresponding area of new circle will be
 A. $121\pi r^2$ ☐ B. $12.1\pi r^2$ ☐
 C. $1.21\pi r^2$ ☐ D. None of the given three ☐
23. The maximum area of a triangle inscribed in a semi-circle having radius 10 cm is cm^2 .
 A. 10 ☐ B. 50 ☐ C. 100 ☐ D. 200 ☐
24. If the area of a circle is 38.5 m^2 , then its circumference will be m.
 A. 22 ☐ B. 2.2 ☐ C. 38.5 ☐ D. 3.85 ☐
25. $\square ABCD$ is a rhombus. If it is inscribed in $\odot(O, r)$, then $\square ABCD$ is a
 A. square ☐ B. rectangle ☐ C. trapezium ☐ D. None of these ☐
26. In $\triangle ABC$, $m\angle B = 90^\circ$, $AB = 4$ and $BC = 3$, then the radius of circle touching all three sides of triangle will be
 A. 1 ☐ B. 2 ☐ C. 3 ☐ D. 4 ☐
27. In $\triangle PQR$, $\frac{PQ}{1} = \frac{PR}{2} = \frac{QR}{\sqrt{3}}$, then $m\angle R =$
 A. 90 ☐ B. 60 ☐ C. 45 ☐ D. 30 ☐
28. From $P(-3, 2)$ the foot of perpendicular drawn on Y-axis is M. Then the coordinates of M are
 A. (3, 0) ☐ B. (0, 2) ☐ C. $(\frac{3}{2}, -1)$ ☐ D. (-3, 2) ☐
29. The distance of $P(a, b)$ from the origin is
 A. $a^2 + b^2$ ☐ B. $|a - b|$ ☐ C. $|a + b|$ ☐ D. $\sqrt{a^2 + b^2}$ ☐
30. Given below is a graph showing two lines.

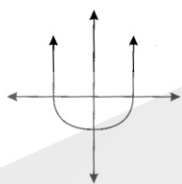


- Which of following statements is true about the solution(s) of the pair of equations represented by these lines?
- A. They have a unique solution. ☐
 B. They do not have any solution. ☐
 C. They have infinite solutions. ☐
 D. We cannot predict the number of solutions without knowing the algebraic form of these equations. ☐
31. 2 years ago, the addition of ages of father-mother and their two daughters was 40 years. After 3 years, the addition of their ages will be years.
 A. 40 ☐ B. 46 ☐ C. 50 ☐ D. 60 ☐

32. In a two-digit number, the digit at tens place is 4 and the product of two digits is 4 times the digit at tens place, then that number is

A. 42 ☐ B. 48 ☐ C. 44 ☐ D. 84 ☐

33. As per the given figure, $y = p(x)$ graph has real zeros.



A. 0 ☐
B. 1 ☐
C. 2 ☐
D. 3 ☐

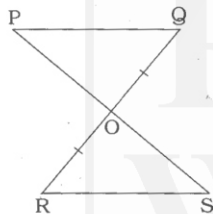
34. The formula for finding the total surface area of a cylinder having cone shaped lids at both the ends, will be

A. $\pi r(l + 2r)$ ☐ B. $\pi r(2h + r)$ ☐ C. $2\pi r(h + l)$ ☐ D. $2\pi r(h + 2r)$ ☐

35. $1 \text{ metre}^3 = \dots \text{ cm}^3$.

A. 1 ☐ B. 10^2 ☐ C. 10^3 ☐ D. 10^6 ☐

36. The two triangles in the figure are congruent using congruence theorem. Here, it is given $OQ = OR$. Which of these conditions alongwith the given condition is sufficient to prove that the two triangles are congruent to each other?



A. $\angle P = \angle S$ ☐
B. $\angle Q = \angle R$ ☐
C. $OP = OS$ ☐
D. $PQ = SR$ ☐

37. $\tan 7\theta \cdot \tan 3\theta = 1$. $\therefore \theta = \dots$

A. 0 ☐ B. 9 ☐ C. 10 ☐ D. 18 ☐

38. When observed from top of tower, the angle of depression of two houses A and B in Eastern and Western direction are 30° and 60° respectively, then

A. House A is nearer to tower than House B. ☐
B. House B is nearer to tower than House A. ☐
C. House A and House B are equidistant from tower. ☐
D. None of the given three ☐

39. On walking for search of a ball x metres on a hill making an angle of measure 30° with the ground, one can reach the height of ' y ' metres from the ground, then

A. $x = y$ ☐ B. $x = 2y$ ☐ C. $2x = \sqrt{3}y$ ☐ D. $2x = y$ ☐

40. The length of minor arc $\widehat{AB}$ of a circle is $\frac{1}{4}$ of its circumference, then the measure of the angle subtended by the minor arc $\widehat{AB}$ will be

A. 30 ☐ B. 45 ☐ C. 90 ☐ D. 60 ☐

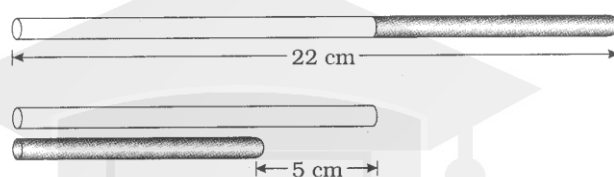
41. The length of minute hand of a clock is 14 cm. If minute hand moves from 1 to 10 on the dial, then cm^2 area will be covered.

A. 462 ☐ B. 154 ☐ C. 308 ☐ D. 616 ☐

42. The product of zeros of cubic polynomial $p(x)$ is

- A. $\frac{-\text{Coefficient of } x^2}{\text{Coefficient of } x^3}$ ☐ B. $\frac{\text{Coefficient of } x}{\text{Coefficient of } x^3}$ ☐
C. $\frac{-\text{The constant term}}{\text{Coefficient of } x^2}$ ☐ D. None of these ☐

43. The diagram below shows two sticks – one BLACK and the other WHITE. Based on the measurements shown, what is the length of the white stick?



- A. 5 cm ☐
B. 8.5 cm ☐
C. 13.5 cm ☐
D. 17 cm ☐

44. $x = \dots$ is identified as GOLDEN NUMBER.

- A. $\frac{1+\sqrt{5}}{2}$ ☐ B. 0 ☐ C. $\frac{1+\sqrt{2}}{2}$ ☐ D. 1 ☐

45. The discriminant of equation $5x^2 - 6x + 1 = 0$ is

- A. 16 ☐ B. $\sqrt{56}$ ☐ C. 4 ☐ D. 56 ☐

46. If is there, then the quadratic equation does not have real solution.

- A. $D = 0$ ☐ B. $D > 0$ ☐ C. $D < 0$ ☐ D. $D \geq 0$ ☐

47. Rachna had an average score of 45 from 6 tests. Her teacher dropped her lowest score, which is 30 and calculated the average of the remaining scores to decide her grade. Which of these gives her new average score?

- A. $\frac{(45 \times 5 - 30)}{5}$ ☐ B. $\frac{(45 \times 6 - 30)}{6}$ ☐
C. $\frac{(45 \times 6 - 30)}{5}$ ☐ D. $\frac{(45 \times 6 - 30)}{6}$ ☐

48. In a maths test taken by 35 students, the average score of 15 girls is 10 and that of 20 boys is also 10. Which of the following can be calculated based on the data we have?

- A. The highest score in the class. ☐
B. The lowest score among the boys in the class. ☐
C. The sum of the scores of the 35 students of the whole class. ☐
D. All of the above can be calculated. ☐

49. If $\tan^2 \theta = \sin^2 \theta + \cos^2 \theta$, then $\theta = \dots$

- A. 30 ☐ B. 45 ☐ C. 60 ☐ D. 90 ☐

50. Which of the following pair is correct for trigonometric inter-relationship?

- | | | |
|------------------|--------------------------------------|---|
| 1. $\cos \theta$ | a. $\frac{\cos \theta}{\sin \theta}$ | A. (1 - d), (2 - e), (3 - b), (4 - a) ☐ |
| 2. $\tan \theta$ | b. $\frac{1}{\cos \theta}$ | B. (1 - b), (2 - a), (3 - e), (4 - d) ☐ |
| 3. $\cot \theta$ | c. $\frac{1}{\sec \theta}$ | C. (1 - c), (2 - d), (3 - a), (4 - b) ☐ |
| 4. $\sin \theta$ | d. $\frac{1}{\cot \theta}$ | D. (1 - e), (2 - b), (3 - c), (4 - d) ☐ |
| | e. $\sin \theta \cdot \cos \theta$ | |

PART : B

SECTION A

Answer the following very short answer questions : [2 marks each] 16

1. Find the square root : $14 + 6\sqrt{5}$
2. Find the quadratic polynomial, whose addition of zeros is $-\frac{7}{3}$ and multiplication is $\frac{4}{3}$.
3. In an Arithmetic Progression $T_7 = 18$ and $T_{18} = 7$. Obtain T_{25} . OR
3. Addition of how many terms of Arithmetic Progression 2, 7, 12, 17, ... will be 990?
4. In $\triangle PQR$ $m\angle Q = 90^\circ$ and $\overline{QM}$ is an altitude; $M \in \overline{PR}$. If $QM = 12$, $PR = 26$; then find PM and RM . If $PM < RM$; then find PQ and QR .
5. Two concentric circles having radii 73 and 55 are given. A chord of circle having greater (larger) radius touches the smaller circle. Then find the length of this chord.
6. Find the area of $\triangle ABC$ having vertices $A(4, 2)$, $B(3, 9)$ and $C(10, 10)$. OR
6. Find the coordinates of points which divide the line segment joining $A(-7, 5)$ and $B(5, -1)$ into three congruent segments (Such points are called the points of trisection of segment).
7. In a hostel, one day reading hours of 20 students were observed, whose result is mentioned in the table below. From the table, find the Mode.

No. of reading hours	1 - 3	3 - 5	5 - 7	7 - 9	9 - 11
No. of students	7	2	8	2	1

8. A card is selected at random from well-shuffled pack of 52 cards. Find the probability that the selected card is (1) black coloured queen. (2) note a king.

SECTION B

Solve the following : [3 marks each] 12

9. Prove $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$

OR

9. Find the value of $\frac{\operatorname{cosec} 38^\circ}{\sec 52^\circ} + \frac{2}{\sqrt{3}} \tan 38^\circ \cdot \tan 60^\circ \cdot \tan 52^\circ - 3(\sin^2 32^\circ + \sin^2 58^\circ)$

10. The chord of circle of 84 cm diameter subtends an angle of measure 60 at the centre of the circle. Find the area of minor segment corresponding to the chord. (Take $\sqrt{3} = 1.73$.)
11. Find the solution of pair of equations : $\frac{5}{2x} + \frac{2}{3y} = 7$; $\frac{3}{x} + \frac{2}{y} = 12$ ($x \neq 0$; $y \neq 0$)
12. Find the median of the following Frequency Distribution.

Class	4 – 8	8 – 12	12 – 16	16 – 20	20 – 24	24 – 28
Frequency	9	16	12	7	15	1

SECTION C

Solve the following : [4 marks each]

12

13. On a hemisphere, frustum of a cone shaped shuttle-cock is used for playing Badminton. The bigger radius of frustum of cone is 5 cm and smaller radius is 2 cm. The height of entire shuttle-cock is 7 cm. Then find the outer surface area of shuttle-cock. (Take $\sqrt{34} = 5.83$.)
14. A jet plane is at a vertical height of h . The angles of depression of two tanks on the horizontal ground are found to have measures α and β ($\alpha > \beta$). Prove that the distance between the tanks is $\frac{h(\tan \alpha - \tan \beta)}{\tan \alpha \cdot \tan \beta}$.
15. The petrol rate is increased by ₹ 5/- per litre. Now in ₹ 1320/-, 2 litres less petrol is obtained as compared to previous rate. Find the increased rate of petrol per litre.
- OR**
15. Kailash's age at present is 2 years less than 6 times the age of his daughter Prerna. The product of their ages 5 years later will be 330. What was the age of Kailash when his daughter Prerna was born?

SECTION D

Solve the following : [5 marks each]

10

16. Draw $\overline{PQ}$, where $PQ = 10$ cm. Draw circle $\odot(P, 4)$ and $\odot(Q, 3)$. Draw tangents to each circle from centre of other circle. Write points of construction. **OR**
16. Draw $\triangle ABC$, where $m\angle ABC = 90^\circ$; $BC = 4$ cm and $AC = 5$ cm and then construct $\triangle BXY$ with $\frac{4}{3}$ scale factor. Write points of construction.
17. Write converse of Pythagoras' Theorem and prove it.