

Time: 3 Hours

General Instructions:

1. This question paper contains five parts A - E.
2. Section A consists of 20 MCQ'S of 1 mark each.
3. Section B consists of 5 questions of 2 marks each.
4. Section C consists of 6 questions of 3 marks each.
5. Section D consists of 4 questions of 5 marks each.
6. Section E consists of 3 case based questions.

SECTION A

19

MARKS

1.	Which of these is QUADRATIC equation having one of its roots as zero? (i) $x^2 + x^2 = 0$ (ii) $x^2 - 2x = 0$ (iii) $x^2 - 9 = 0$ (a) only (i) (b) only (ii) (c) only (i) & (ii) (d) <input checked="" type="checkbox"/> only (ii) & (iii)	
2.	Two linear equations in variable x and y are given below: $a_1x + b_1y + c = 0$ $a_2x + b_2y + c = 0$ Which of the following is independently sufficient to determine a solution exists or not for this pair of linear equation? (i) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = 1$ (ii) $\frac{a_1}{b_1} = \frac{a_2}{b_2}$ (iii) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq 1$ (iv) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ (a) iv (b) i & iv <input checked="" type="checkbox"/> (c) ii & iv (d) i & iii	
3.	In a right angled triangle PQR, $\angle Q = 90^\circ$. Which of these is always 0? (a) $\csc P - \sec R$ (b) $\tan P - \cot R$ <input checked="" type="checkbox"/> (c) $\sin P - \operatorname{cosec} R$ (d) cannot be known without knowing the value of P	
4.	If the height of a vertical pole is $\sqrt{3}$ times the length of its shadow on the ground, then the angle of elevation of the sun at that time is (a) 30° (b) 60° <input checked="" type="checkbox"/> (c) 45° (d) 75°	
5.	A number was selected at random from 1 to 100 (inclusive of both number) and it was found to be a multiple of 10. What is the probability that the selected number is a multiple of 5? (a) $\frac{1}{10}$ (b) $\frac{1}{5}$ <input checked="" type="checkbox"/> (c) $\frac{1}{2}$ (d) 1	
6.	Two dice are rolled simultaneously. What is the probability that 6 will come up at least once?	

a) $\frac{1}{6}$ b) $\frac{7}{16}$ c) $\frac{11}{16}$ d) $\frac{15}{16}$

7. which term of the arithmetic progression $20, 19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}, \dots$ is the first negative term?

a) 27th termb) 28th termc) 26th termd) 25th term

8. Points A(-1, y) and B(5, 7) lie on a circle with centre O(2, -3y). The values of y are:

a) 1, -7

b) -1, 7

c) 2, 7

d) -2, -7

9. If the vertices of a parallelogram PQRS taken in order are P(3, 4), Q(-2, 3) and R(-3, -2), then the coordinates of its fourth vertex S are:

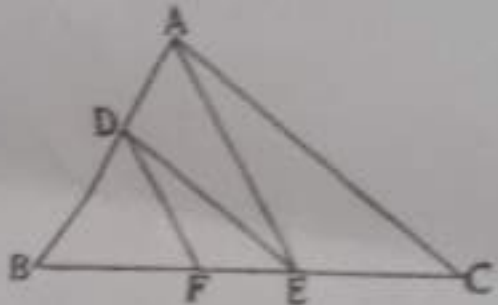
a) (-2, -1)

b) (-2, -3)

c) (2, -1)

d) (1, 2)

10. In the figure below, DE || AC and DF || AE. Which of these is equal to $\frac{BF}{FE}$?

a) $\frac{DF}{AE}$ b) $\frac{BE}{EC}$ c) $\frac{BA}{AC}$ d) $\frac{FE}{BC}$

11. The empirical relation between the mode, median and mean of a distribution is:

a) Mode = 3 Median - 2 Mean

b) Mode = 3 Mean - 2 Median

c) Mode = 2 Median - 3 Mean

d) Mode = 2 Mean - 3 Median

12. If $k + 2$, $4k - 6$ and $3k - 2$ are three consecutive terms of A.P. then the value of k is:

a) 3

b) -3

c) 4

d) -4

13. The graph of a polynomial $p(x)$ intersects the x axis at 3 points and touches it at 2 other points. The number of zeroes of $p(x)$ is:

a) 1

b) 2

c) 3

d) 5

14. If PA and PB are tangents to the circle with centre O such that $\angle APB = 50^\circ$, then $\angle OAB$ is equal to:

a) 20° b) 30° c) 40° d) 50°

In the given figure, $DE \parallel BC$, $AE = a$ units, $EC = b$ units, $DE = x$ units and $BC = y$ units.

Which of the following is true?



a) $x = \frac{a+b}{a^2}$

b) $y = \frac{ax}{a+b}$

c) $x = \frac{ay}{a+b}$ ✓

d) $\frac{x}{y} = \frac{a}{b}$

16. If two tangents inclined at an angle of 60° are drawn to a circle of radius 3 cm, then the length of each tangent is equal to

a) $\frac{2\sqrt{3}}{3}$ cm

b) 3 cm

c) 6 cm

d) $\sqrt{3}$ cm ✓

17. If two solid hemispheres of same base radius 'r' are joined together along their bases, the curved surface area of this new solid is

a) $4\pi r^2$ ✓

b) $6\pi r^2$

c) $3\pi r^2$

d) $8\pi r^2$

18. Consider the following frequency distribution:

C.I.	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25
FREQUENCY	13	10	15	8	11

The upper limit of the median class is:

a) 7

b) 17.5

c) 15 ✓

d) 18.5

Assertion and Reason

- 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.

The first term of an A.P. is 3, the last term is 83 and sum of all its terms is 903. Find the number of terms and the common difference.

3

OR

The ratio of the 11th term to the 18th term of an A.P. is 2 : 3. Find the ratio of the sum of first 5 terms to the sum of first 21 terms.

3

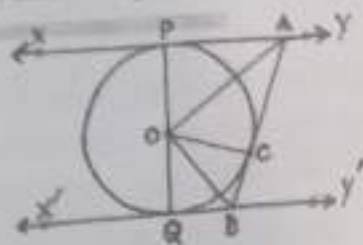
29. Prove that: $(\sin \theta + \cos \theta)(\tan \theta + \cot \theta) = \sec \theta + \operatorname{cosec} \theta$

3

30. Prove that the parallelogram circumscribing a circle is a rhombus.

OR

In figure XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with the point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90^\circ$.



31. In similar triangles, $\triangle ABC$ and $\triangle PQR$, AD and PM are the medians respectively.

3

Prove that $\frac{AD}{PM} = \frac{AB}{PQ}$

SECTION D

32. An aeroplane at an altitude of 200m observes the angle of depression of opposite points on the two banks of a river to be 45° and 60° . Find the width of the river. (use $\sqrt{3} = 1.732$)

5

OR

There is a small island in the middle of a 100 m wide river and a tall tree stands on the island. P and Q are points directly opposite to each other on two banks and in line with the tree. If the angles of elevation of the top of the tree from P and Q are respectively 30° and 45° , find the height of the tree. (use $\sqrt{3} = 1.732$)

33. 250 apples of a box were weighted and the distribution of masses of the apples is given in the following table:

5

Mass (in grams)	80 - 100	100 - 120	120 - 140	140 - 160	160 - 180
No. of apples	20	60	70	y	60

- Find the value of y and the mean mass of the apples.
- Find the modal mass of the apples.

34.

A container shaped like a cylinder having diameter 12 cm and height 15 cm, full of ice cream. The ice cream is to be filled into cones of height 12 cm and diameter 6 cm, having hemispherical shape on top. Find the number of such cones which can be filled with ice cream.

OR

Water is flowing through a cylindrical pipe of internal diameter 2 cm into a cylindrical tank of base radius 40 cm at the rate of 0.7 m / sec. By how much will the water level rise in the tank in half an hour?

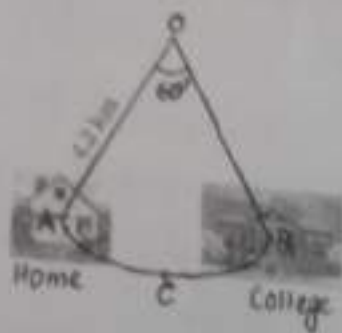
35.

Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

SECTION E

36.

Kartik has his home located at A and his college at B. Kartik drives his motorbike three days a week and rides his bicycle in the remaining three days, to go to his college and back to home. AOB is a sector of a circle with centre O, central angle 60° and radius 4.2 km. Path AOB is the route for driving by motorbike and path ACB is for bicycle only.



On the basis of above information, answer the following questions:

- Find the total distance travelled by Kartik through the bicycle in a week to go to college.
- Find the area of the sector AOB.

37.

Controlling Air Pollution

The chief Minister of Delhi launched the Switch Delhi, an electric vehicle mass awareness campaign in the National Capital. The government has also issued tenders for setting up 100 charging stations across the city. Each station will have five charging points. For demo charging station is setup along a straight line and has charging points at $A\left(\frac{-7}{2}, 0\right)$, $B\left(0, \frac{7}{4}\right)$, $C(3, 4)$, $D(7, 7)$ and $E(x, y)$. Also, the distance between C and E is 10 units.



On the basis of above information, answer the following questions:

- a) Find the distance DE. 2
- b) Find the ratio in which B divides AC. 2

8. Raj and Ajay are very close friends. Both the families decide to go to Ranikhet by their own cars. Raj's car travels at a speed of x km/h while Ajay's car travels 5 km/h faster than Raj's car. Raj took 4 hours more than Ajay to complete the journey of 400 km.



On the basis of above information, answer the following questions:

- i) What will be the distance covered by Ajay's car in two hours? ⓧ
- a) $2(x + 5)$ km ✓ b) $(x - 5)$ km
- c) $2(x + 10)$ km d) $(2x + 5)$ km !
- ii) Which of the following quadratic equation represents the speed at which Raj drove his car? ⓧ
- a) $x^2 - 5x - 500 = 0$ b) $x^2 + 4x - 400 = 0$
- c) $x^2 + 5x - 500 = 0$ d) $x^2 - 4x + 400 = 0$
- iii) What is the speed of Raj's car? ⓧ
- a) 20 km/hour b) 15 km/hour
- c) 25 km/hour d) 10 km/hour

iv) How much time Ajay took to travel 400 km?

a) 20 hour

b) 40 hour

c) 25 hour

d) 16 hour

Calculations