SECTION – A
Questions 1 to 20 carry 1 mark each.

1. There are 576 boys and 448 girls in a school that are to be divided into equal sections of either boys or girls alone. The total number of sections thus formed are:
   (a) 22       (b) 16       (c) 36       (d) 21

2. The decimal expansion of the rational number \( \frac{7}{200 \times 25} \) will terminate after
   (a) one decimal place       (b) two decimal places
   (c) three decimal places    (d) four decimal places

3. If \( x = a, y = b \) is the solution of the pair of equations \( x - y = 2 \) and \( x + y = 4 \), then the respective values of \( a \) and \( b \) are
   (a) 3, 5       (b) 5, 3       (c) 3, 1       (d) \(-1, -3\)

4. The points \((-4, 0), (4, 0)\) and \((0, 3)\) are the vertices of a/an
   (a) right triangle       (b) isosceles triangle
   (c) equilateral triangle (d) scalene triangle

5. If the distance between the points \((4, p)\) and \((1, 0)\) is 5 units, then the value of \( p \) is
   (a) 4 only       (b) \( \pm 4 \)       (c) \(-4\) only       (d) 0

6. If the segment joining the points \((a, b)\) and \((c, d)\) subtends a right angle at the origin, then
   (a) \( ac - bd = 0 \)       (b) \( ac + bd = 0 \)       (c) \( ab + cd = 0 \)       (d) \( ab - cd = 0 \)

7. The value of \( 3 \cot^2 60^\circ + \sec^2 45^\circ \) is
   (a) 1       (b) 2       (c) 3       (d) none of these

8. If \( 3x = \cosec \theta \) and \( \frac{3}{x} = \cot \theta \), find the value of \( 3\left(\frac{x^2}{x^2} - \frac{1}{x^2}\right) \)
   (a) \( \frac{1}{3} \)       (b) 1       (c) 3       (d) none of these

9. If \( \sec A = \frac{15}{7} \) and \( A + B = 90^\circ \), find the value of cosec B.
   (a) \( \frac{15}{12} \)       (b) \( \frac{7}{15} \)       (c) \( \frac{15}{7} \)       (d) none of these
10. For the following distribution:

<table>
<thead>
<tr>
<th>Class</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>8</td>
</tr>
<tr>
<td>10-20</td>
<td>10</td>
</tr>
<tr>
<td>20-30</td>
<td>12</td>
</tr>
<tr>
<td>30-40</td>
<td>22</td>
</tr>
<tr>
<td>40-50</td>
<td>30</td>
</tr>
<tr>
<td>50-60</td>
<td>18</td>
</tr>
</tbody>
</table>

The median class is
(a) 10-20  (b) 20-30  (c) 30-40  (d) 40-50

11. In the adjoining figure, DE || BC. If AD = x, DB = x – 2, AE = x + 2 and EC = x – 1, then the value of x is ______

12. If zeroes of p(x) = 2x^2 – 7x + k are reciprocal of each other, then value of k is _______.

OR

If the roots of the equation 12x^2 + mx + 5 = 0 are in the ratio 3 : 2, then m equals _______.

13. 7th term of an AP is 40. The sum of its first 13th terms is _______.

14. For what value of k, are the roots of the quadratic equation 3x^2 + 2kx + 27 = 0 real and equal.

15. Cards bearing numbers 3 to 20 are placed in a bag and mixed thoroughly. A card is taken out from the bag at random then the probability that the number on the card taken out is an even number is _______.

16. A sphere of maximum volume is cut out from a solid hemisphere of radius 7 cm then the ratio of the volume of the hemisphere to that of the cut out sphere is _______.

17. If the areas of two similar triangles are in ratio 25 : 64, write the ratio of their corresponding sides.

18. If a and b are two positive integers such that a = bq + r, where q and r are integers. If a < b, then find the value of q.

19. In figure if ∠ATO = 40°, find AOB.

20. If the sum of first m terms of an AP is 2m^2 + 3m, then what is its second term?
SECTION – B
Questions 21 to 26 carry 2 marks each.

21. Three cards of spades are lost from a pack of 52 playing cards. The remaining cards were well shuffled and then a card was drawn at random from them. Find the probability that the drawn card is of black colour.

OR
All the three face cards of spades are removed from a well-shuffled pack of 52 cards. A card is then drawn at random from the remaining pack. Find the probability of getting (i) a black face card, (ii) a queen,

22. In the given below left figure, PA and PB are tangents to a circle from an external point P such that PA = 4 cm and $\angle BAC = 135^0$. Find the length of chord AB.

\[ \text{PA} = 4 \text{ cm} \]
\[ \angle BAC = 135^0 \]

23. A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter and the total height of the vessel are shown in the above right sided figure. (a) Find the curved surface area of the cylinder. (b) Find the inner surface area of the vessel.

24. A contractor plans to install two slides for the children to play in a park. For the children below the age of 5 years, she prefers to have a slide whose top is at a height of 1.5 m, and is inclined at an angle of 30° to the ground, whereas for elder children, she wants to have a steep slide at a height of 3 m, and inclined at an angle of 60° to the ground. What should be the length of the slide in each case?

25. In the below left figure, DE || BC. If AD = 1.5 cm, BD = 2AD, then find $\frac{ar(\triangle ADE)}{ar(\text{trapezium } BCED)}$.

\[ \text{AD} = 1.5 \text{ cm} \]
\[ \text{BD} = 2 \cdot \text{AD} \]

OR
In the above right sided triangle PQR, $\angle QPR = 90^0$, PQ = 24 cm and QR = 26 cm and in $\triangle PKR$, $\angle PKR = 90^0$ and KR = 8 cm, find PK.

\[ \angle QPR = 90^0 \]
\[ PQ = 24 \text{ cm} \]
\[ QR = 26 \text{ cm} \]
\[ \angle PKR = 90^0 \]
\[ KR = 8 \text{ cm} \]
26. Find the value of the middle term of the following AP: –6, –2, 2, ..., 58.

**SECTION – C**

Questions 27 to 34 carry 3 marks each.

27. Find the values of a and b for which the following pair of linear equations has infinitely many solutions: 3x – (a + 1)y = 2b – 1; 5x + (1 – 2a)y = 3b

OR

Solve for x and y : 8x – 9y = 6xy; 10x + 6y = 19xy

28. Use Euclid’s division lemma to show that the cube of any positive integer is of the form 9m, 9m + 1 or 9m + 8.

OR

Prove that $\sqrt{3}$ is an irrational number and hence show that $7 + 2\sqrt{3}$ is also an irrational number.

29. The class X students of a secondary school in Krishinagar have been allotted a rectangular plot of land for their gardening activity. Saplings of Gulmohar are planted on the boundary at a distance of 1 m from each other. There is a triangular grassy lawn in the plot as shown in the figure. The students are to sow seeds of flowering plants on the remaining area of the plot.

(a) Taking A as origin, find the coordinates of the vertices of the triangle.

(b) What will be the coordinates of the vertices of APQR if C is the origin?

(c) Also calculate the areas of the triangles in these cases. What do you observe?

![Diagram of a rectangular plot with coordinates and a triangular grassy lawn.]

30. In given figure, ABC is a triangle right-angled at B, with AB = 14 cm and BC = 24 cm. With the vertices A, B and C as centres, arcs are drawn each of radius 7 cm. Find the area of the shaded region. [use $\pi = \frac{22}{7}$]

![Diagram of a right-angled triangle with shaded regions formed by arcs.]

Prepared by: M. S. KumarSwamy, TGT(Maths)
31. There are 50 teachers in a school. Their salaries were recorded by a person and he drew a graph based on the data he collected.

Based on the above graph, answer the following questions.
(a) Write the nature of the curve.
(b) Find the median.
(c) If mean is 14.5 then find the mode.

32. Prove that: \( \frac{\tan \theta - 1 + \sec \theta}{\tan \theta + 1 - \sec \theta} = \sec \theta + \tan \theta \)

OR

In an acute angled triangle ABC, if \( \sin (A + B - C) = \frac{1}{2} \) and \( \cos (B + C - A) = \frac{1}{2} \), find \( \angle A \), \( \angle B \) and \( \angle C \).

33. How many terms of the AP \(-6, -\frac{11}{2}, -5, \ldots\) are needed to give the sum \(-25\)? Explain the double answer.

34. If two zeroes of the polynomial \( x^4 + 3x^3 - 20x^2 - 6x + 36 \) are \( \sqrt{2} \) and \(-\sqrt{2}\), find the other zeroes of the polynomial.

**SECTION D**
Questions 35 to 40 carry 4 marks each.

35. Solve for \( x \):
\[
\frac{x + 1}{x - 1} - \frac{x - 1}{x + 1} = \frac{5}{6}, \quad x \neq 1, -1
\]

OR

While boarding an aeroplane, a passenger got hurt. The pilot showing promptness and concern, made arrangements to hospitalize the injured and so the plane started late by 30 minutes. To reach the destination, 1500 km away in time, the pilot increased the speed by 100 km/hr. Find the original speed of the plane.
36. Draw a pair of tangents to a circle of radius 3 cm which are inclined at an angle of 60° to each other.

**OR**

Draw a triangle ABC with side BC = 7 cm, B = 45°, A = 105°. Then, construct a triangle whose sides are 4/3 times the corresponding sides of Δ ABC.

37. Water is flowing at the rate of 15 km/hr through a pipe of diameter 14 cm into a cuboidal pond which is 50 m long and 44 m wide. In what time will the level of the water in the pond rise by 21 cm?

**OR**

An open metal bucket is in the shape of a frustum of a cone, mounted on a hollow cylindrical base made of the same metallic sheet. The diameters of the two circular ends of the bucket are 45 cm and 25 cm, the total vertical height of the bucket is 40 cm and that of the cylindrical base is 6 cm. Find the area of the metallic sheet used to make the bucket, where we do not take into account the handle of the bucket. Also, find the volume of water the bucket can hold.

38. The angles of depression of two ships from the top of a lighthouse and on the same side of it are found to be 45° and 30°. If the ships are 200 m apart, find the height of the lighthouse.

39. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

40. Following table shows marks (out of 100) of students in a class test:

<table>
<thead>
<tr>
<th>Marks</th>
<th>No. of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than or equal to 0</td>
<td>80</td>
</tr>
<tr>
<td>More than or equal to 10</td>
<td>77</td>
</tr>
<tr>
<td>More than or equal to 20</td>
<td>72</td>
</tr>
<tr>
<td>More than or equal to 30</td>
<td>65</td>
</tr>
<tr>
<td>More than or equal to 40</td>
<td>55</td>
</tr>
<tr>
<td>More than or equal to 50</td>
<td>43</td>
</tr>
<tr>
<td>More than or equal to 60</td>
<td>28</td>
</tr>
<tr>
<td>More than or equal to 70</td>
<td>16</td>
</tr>
<tr>
<td>More than or equal to 80</td>
<td>10</td>
</tr>
<tr>
<td>More than or equal to 90</td>
<td>8</td>
</tr>
<tr>
<td>More than or equal to 100</td>
<td>0</td>
</tr>
</tbody>
</table>

Draw a 'more than type' ogive. From the curve, find the median. Also, check the value of the median by actual calculation.