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

1. If \( n \) is an even natural number, then the largest natural number by which \( n(n + 1)(n + 2) \) is divisible is
   (a) 6           (b) 8           (c) 12           (d) 24

2. The largest number which divides 70 and 125, leaving remainders 5 and 8, respectively, is
   (a) 13          (b) 65          (c) 875         (d) 1750

3. The point on the \( x \)-axis which is equidistant from the points \( A(−2, 3) \) and \( B(5, 4) \) is
   (a) \((0, 2)\)    (b) \((2, 0)\)    (c) \((3, 0)\)    (d) \((-2, 0)\)

4. If \( 3x + 4y : x + 2y = 9 : 4 \), then \( 3x + 5y : 3x - y \) is equal to
   (a) \(4 : 1\)    (b) \(1 : 4\)    (c) \(7 : 1\)    (d) \(1 : 7\)

5. If \( \sec 5A = \cosec(\alpha + 30^\circ) \), where \( 5A \) is an acute angle, then the value of \( \alpha \) is
   (a) \(15^\circ\)    (b) \(5^\circ\)    (c) \(20^\circ\)    (d) \(10^\circ\)

6. The value of \( \sin^260^\circ + 2\tan45^\circ - \cos^230^\circ \) is
   (a) \(1\)        (b) \(2\)        (c) \(-1\)        (d) none of these

7. If \( \tan A = \frac{5}{12} \), find the value of \( (\sin A + \cos A) \cdot \sec A \).
   (a) \(\frac{7}{12}\)    (b) \(\frac{17}{12}\)    (c) \(\frac{5}{12}\)    (d) none of these

8. Ratio in which the line \( 3x + 4y = 7 \) divides the line segment joining the points \((1, 2)\) and \((-2, 1)\) is
   (a) \(3 : 5\)    (b) \(4 : 6\)    (c) \(4 : 9\)    (d) none of these

9. C is the mid-point of PQ, if P is \((4, x)\), C is \((y, -1)\) and Q is \((-2, 4)\), then \( x \) and \( y \) respectively are
   (a) \(-6\) and 1    (b) \(-6\) and 2    (c) \(6\) and \(-1\)    (d) \(6\) and \(-2\)
10. The median class of the following data is:

<table>
<thead>
<tr>
<th>Marks</th>
<th>Below 10</th>
<th>Below 20</th>
<th>Below 30</th>
<th>Below 40</th>
<th>Below 50</th>
<th>Below 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of students</td>
<td>4</td>
<td>10</td>
<td>18</td>
<td>28</td>
<td>40</td>
<td>70</td>
</tr>
</tbody>
</table>

(a) 20 – 30  (b) 30 – 40  (c) 40 – 50  (d) 50 – 60

11. The 11th term of the AP: \(-5, -\frac{5}{2}, 0, \frac{5}{2}, \ldots\) is _____

12. In the below figure, P and Q are points on the sides AB and AC respectively of a triangle ABC. PQ is parallel to BC and divides the triangle ABC into 2 parts, equal in area. The ratio of PA:AB =_____

![Triangle ABC with P and Q on sides]

13. The volume (in cm\(^3\)) of the largest right circular cone that can be cut off from a cube of edge 4.2 cm is ______

14. If \(x = 3\) is one zero of the quadratic polynomial \(x^2 - 2kx - 6\), then the value of \(k\) is _____

OR

The value(s) of \(k\) for which the equation \(x^2 + 5kx + 16 = 0\) has real and equal roots is _____

15. The probability of getting a bad egg in a lot of 400 is 0.035. The number of bad eggs in the lot is ______.

16. In an AP, if the common difference \((d) = -4\), and the seventh term \((a_7)\) is 4, then find the first term.

17. Find the values of \(x\) and \(y\) is the given figure.

![Tree diagram with labels 1001, x, 143, 11, y]

18. AB and CD are two common tangents to circles which touch each other at a point C. If D lies on AB such that CD = 4 cm then find AB.

OR

Two chords AB and CD of a circle intersect at E such that AE = 2.4 cm, BE = 3.2 cm and CE = 1.6 cm. Find the length of DE.

19. If \(\alpha, \beta\) are the roots of the quadratic equation \(x^2 - p(x + 1) - c = 0\), then find the value of \((\alpha + 1)(\beta + 1)\)
20. The areas of two similar triangles $ABC$ and $PQR$ are in the ratio $9:16$. If $BC = 4.5$ cm, then find the length of $QR$.

**SECTION – B**

Questions 21 to 26 carry 2 marks each.

21. The radii of two concentric circles are 13 cm and 8 cm. $AB$ is a diameter of the bigger circle and $BD$ is a tangent to the smaller circle touching it at $D$ and intersecting the larger circle at $P$ on producing. Find the length of $AP$.

22. In the given figure, express $x$ in terms of $a, b$ and $c$.

23. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle $30^\circ$ with it. The distance between the foot of the tree to the point where the top touches the ground is 8 m. The teacher asked the students to find the height of the tree. All the students failed but Neeraj took initiative and calculated it correctly using trigonometry. What height Neeraj calculated?

24. A juice seller was serving his customers using glasses as shown in below figure. The inner diameter of the cylindrical glass was 5 cm, but the bottom of the glass had a hemispherical raised portion which reduced the capacity of the glass. If the height of a glass was 10 cm, find its actual capacity of the glass. (Use $\pi = 3.14$.)

25. If 7 times the 7th term of an A.P is equal to 11 times its 11th term, then find its 18th term.

26. A card is drawn at random from a well shuffled deck of 52 cards. Find the probability of getting neither a red card nor a queen.

**OR**

Two different dice are tossed together. Find the probability:

(i) of getting a doublet
(ii) of getting a sum 10, of the numbers on the two dice.
SECTION – C
Questions 27 to 34 carry 3 marks each.

27. There sets of Mathematics, Science and Biology books have to be stacked in such a way that all the books are stored subject wise and the height of each stack is the same. The number of Mathematics books is 240, the number of Science books is 960 and the number of Biology books is 1024. Find the number of stack of Mathematics, Science and Biology books, assuming that the books are of the same thickness.

OR
Find HCF of 81 and 237 and express it as a linear combination of 81 and 237.

28. Find all zeroes of the polynomial \((2x^4 - 9x^3 + 5x^2 + 3x - 1)\) if two of its zeroes are \((2 + \sqrt{3})\) and \((2 - \sqrt{3})\).

29. If \(\sec \theta + \tan \theta = p\), then find the value of cosec \(\theta\).

OR
Prove that: \(\sin \theta (1 + \tan \theta) + \cos \theta (1 + \cot \theta) = \sec \theta + \cosec \theta\).

30. In order to complete the project work, Aditya went to a company to collect the data of 280 persons working in the company. After collecting the data, he analyzed the data and prepared a report on the salary of all the employees. Using the report, he drew the following graph as given below. Identify the type of the graph. Construct the frequency distribution table using the given curve and then find the median of the data.
31. To raise social awareness about hazards of smoking, a school decided to start "No Smoking" campaign. 10 students are asked to prepare campaign banners for four places A, B, C and D so that ABCD will form a parallelogram. If A(−2, 1), B(a, 0), C(4, b) and D(1, 2) are the vertices of a parallelogram ABCD, find the values of a and b. Hence find the lengths of its sides.

32. A boat goes 30 km upstream and 44 km downstream in 10 hours. In 13 hours, it can go 40 km upstream and 55 km down-stream. Determine the speed of the stream and that of the boat in still water.

OR

Solve the pair of linear equations:
\[(a − b)x + (a + b)y = a^2 − 2ab − b^2\]
\[(a + b)(x + y) = a^2 + b^2\]

33. In the below figure, two circular flower beds have been shown on two sides of a square lawn ABCD of side 56 m. If the centre of each circular flower bed is the point of intersection O of the diagonals of the square lawn, find the sum of the areas of the lawn and the flower beds.

34. The sum of four consecutive numbers in an AP is 32 and the ratio of the product of the first and the last term to the product of two middle terms is 7 : 15. Find the numbers.

SECTION – D

Questions 35 to 40 carry 4 marks each.

35. A plane left 30 minutes late than its scheduled time and in order to reach the destination 1500 km away in time, it had to increase its speed by 100 km/h from the usual speed. Find its usual speed.

OR

A train takes 2 hours less for a journey of 300 km if its speed is increased by 5 km/h from its usual speed. Find the usual speed of the train.

36. A man on the top of a vertical observation tower observes a car moving at a uniform speed coming directly towards it. If it takes 12 minutes for the angle of depression to change from 30° to 45°, how long will the car take to reach the observation tower from this point?

37. Draw a triangle ABC with BC = 6 cm, AB = 5 cm and \(\angle ABC = 60^\circ\). Then construct a triangle whose sides are \(\frac{7}{4}\) of the corresponding sides of the \(\triangle ABC\).

OR

Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm and taking B as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.
38. Prove that "The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides."

39. Water is flowing at the rate of 15 km per hour through a pipe of diameter 14 cm into a rectangular tank which is 50 m long and 44 m wide. Find the time in which the level of water in the tank will rise by 21 cm.

OR

The diameters of the lower and upper ends of a bucket in the form of a frustum of a cone are 10 cm and 30 cm respectively. If its height is 24 cm, find the area of the metal sheet used to make the bucket. [Use \( \pi = 3.14 \)]

40. The mean of the following distribution is 18. Find the frequency \( f \) of the class 19 – 21.

<table>
<thead>
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<th>Class</th>
<th>11 - 13</th>
<th>13 - 15</th>
<th>15 - 17</th>
<th>17 - 19</th>
<th>19 - 21</th>
<th>21 - 23</th>
<th>23 - 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>13</td>
<td>( f )</td>
<td>5</td>
<td>4</td>
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</tbody>
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