SECTION – A

Questions 1 to 20 carry 1 mark each.

1. The HCF of two numbers is 145 and their LCM is 2175. If one number is 725, then find the other number.
   (a) 145  (b) 435  (c) 725  (d) none of these
   Ans: (b) 435

2. What is the HCF of smallest composite number and smallest prime number?
   (a) 2  (b) 1  (c) 0  (d) none of these
   Ans: (a) 2

3. For any integer a and 3, there exists unique integers q and r such that a = 3q + r. Find the possible values of r.
   (a) 2  (b) 1  (c) 0  (d) All of these
   Ans: (d) All of these

4. A box contains 3 blue, 2 white, and 5 red marbles. If a marble is drawn at random from the box, then what is the probability that the marble will be neither red nor blue?
   (a) 1  (b) \( \frac{4}{5} \)  (c) \( \frac{1}{5} \)  (d) \( \frac{2}{5} \)
   Ans: (c) \( \frac{1}{5} \)

5. The distance of A(-5, -12) from the origin is
   (a) 12  (b) 11  (c) 13  (d) 10
   Ans: (c) 13

6. Which are the zeroes of \( p(x) = 6x^2 - 7x - 3 \):
   (a) 5, -2  (b) -5, 2  (c) -5, -2  (d) none of these
   Ans: (d) none of these

7. If the sum of the zeroes of the polynomial \( 3x^2 - kx + 6 \) is 3, then the value of k is:
   (a) 3  (b) -3  (c) 6  (d) 9
   Ans: (d) 9

8. Find the ordinate of a point whose abscissa is 10 and which is at a distance of 10 units from the point P(2, -3).
   (a) 3  (b) -9  (c) both (a) or (b)  (d) none of these
   Ans: (c) both (a) or (b)

9. Consider the following distribution:

<table>
<thead>
<tr>
<th>Marks</th>
<th>Above 0</th>
<th>Above 10</th>
<th>Above 20</th>
<th>Above 30</th>
<th>Above 40</th>
<th>Above 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Students</td>
<td>63</td>
<td>58</td>
<td>55</td>
<td>51</td>
<td>48</td>
<td>42</td>
</tr>
</tbody>
</table>

   The frequency of the class 30 – 40 is
   (a) 3  (b) 4  (c) 48  (d) 41
   Ans: (a) 3

10. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80°, then \( \angle POA \) is equal to
    (a) 60°  (b) 70°  (c) 80°  (d) 50°
    Ans: (d) 50°
11. The value of k if the points A(2, 3), B(4, k) and C(6, −3) are collinear is 0.

12. Given 15 cot A = 8, then cosec A = \( \frac{17}{25} \).

13. The value of \( \sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ \) is 1.

14. If a ladder 10 m long reaches a window 8 m above the ground, then the distance of the foot of the ladder from the base of the wall is 6 m.

15. The values of k for quadratic equation \( kx(x − 2) + 6 = 0 \), so that they have two equal roots is 6.

   OR

   The value of k so that the following system of equations has no solution is \( k \neq −10 \).

   \[
   \begin{align*}
   3x − y − 5 &= 0, \\
   6x − 2y + k &= 0
   \end{align*}
   \]

16. If the circumference is numerically equal to 3 times the area of a circle, then find the radius of the circle. Ans: \( r = \frac{2}{3} \).

17. Five cards—the ten, jack, queen, king and ace of diamonds, are well-shuffled with their face downwards. One card is then picked up at random. What is the probability that the card is the face card? Ans: \( \frac{4}{5} \).

18. Which term of the AP : 21, 18, 15, . . . is –81? Ans: 35th term

19. Evaluate: \( \frac{\sin^2 63^\circ + \sin^2 27^\circ}{\cos^2 17^\circ + \cos^2 73^\circ} \). Ans: 1

   OR

   Express \( \sin 67^\circ + \cos 75^\circ \) in terms of trigonometric ratios of angles between 0° and 45°.

   Ans: \( \cos 23^\circ + \sin 15^\circ \).

20. In figure, S and T are points on the sides PQ and PR, respectively of \( \triangle PQR \), such that PT = 2 cm, TR = 4 cm and ST is parallel to QR. Find the ratio of the areas of \( \triangle PST \) and \( \triangle PQR \).

   Ans: 1 : 9

SECTION – B

Questions 21 to 26 carry 2 marks each.

21. A game consists of tossing a one rupee coin 3 times and noting its outcome each time. Hanif wins if all the tosses give the same result i.e., three heads or three tails, and loses otherwise. Calculate the probability that Hanif will lose the game.

   Ans: NCERT Exercise 15.1 Q23

22. A box contains 100 discs which are numbered from 1 to 100. If one disc is drawn at random from the box, find the probability that it bears (i) a two-digit number (ii) a perfect square number

   Ans: Total number of discs = 100

   (i) No. of two digit numbers = 91

   Required Probability = \( \frac{91}{100} \)

   (ii) No. of perfect square numbers = 10

   Required Probability = \( \frac{10}{100} = \frac{1}{10} \)
A piggy bank contains hundred 50p coins, fifty Re 1 coins, twenty Rs 2 coins and ten Rs 5 coins. If it is equally likely that one of the coins will fall out when the bank is turned upside down, what is the probability that the coin (i) will be a 50 p coin ? (ii) will not be a Rs 5 coin?
Ans: NCERT Exercise 15.1 Q10

23. In a right triangle ABC, right-angled at B, if tan A = 1, then verify that 2 sin A cos A = 1.
Ans: NCERT Introduction to Trigonometry Example 4 p-180

OR

In Δ PQR, right-angled at Q, PR + QR = 25 cm and PQ = 5 cm. Determine the value of sin P.
Ans: NCERT Introduction to Trigonometry Exercise 8.1 Q10 p-181

24. Prove that the parallelogram circumscribing a circle is a rhombus.
Ans: NCERT Exercise 10.2 Q11

25. The wheels of a car are of diameter 80 cm each. How many complete revolutions does each wheel make in 10 minutes when the car is travelling at a speed of 66 km per hour?
Ans: NCERT Exercise 12.1 Q

26. Using division algorithm, find the quotient and remainder on dividing f(x) by g(x) where f(x) = 6x^3 + 13x^2 + x – 2 and g(x) = 2x + 1.
Ans: q(x) = 3x^2 + 5x – 2 and r(x) = 0

SECTION – C
Questions 27 to 34 carry 3 marks each.

27. Prove that √5 is an irrational number. Hence show that 3 – 2√5 is also an irrational number.
Ans: NCERT Exercise 1.3 Q1

OR

Use Euclid’s division lemma to show that the square of any positive integer is either of the form 3m or 3m + 1 for some integer m.
Ans: NCERT Exercise 1.1 Q4

28. A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC into which BC is divided by the point of contact D are of lengths 8 cm and 6 cm respectively (see the below figure). Find the sides AB and AC.

Ans: NCERT Exercise 10.2 Q12

29. If two zeroes of a polynomial x^4 – x^3 – 3x^2 + 3x are √3 and –√3, then find the other two zeroes.
Ans: Here p(x) = x^4 – x^3 – 3x^2 + 3x
⇒ √3 and –√3 are the zeroes of p(x) ⇒ x – √3 and x + √3 are the factors of p(x)
⇒ (x – √3)(x + √3) = x^2 – 3 is a factor of p(x)
⇒ p(x) = x^4 – x^3 – 3x^2 + 3x = x(x^3 – 3x + 3) = x(x – 1)(x^2 – 3)
⇒ x = 0, 1 are the other zeroes
30. If \( \tan (A + B) = \sqrt{3} \) and \( \tan (A - B) = \frac{1}{\sqrt{3}}; \) \( 0^\circ < A + B \leq 90^\circ; \) \( A > B, \) find \( A \) and \( B. \)

**Ans:** NCERT Exercise 8.2 Q3

**OR**

Prove that \( \frac{1 + \tan^2 A}{1 + \cot^2 A} = \left( \frac{1 - \tan A}{1 - \cot A} \right)^2 = \tan^2 A \)

**Ans:** NCERT Exercise 8.4 Q5 (x)

31. 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.

**Ans:** NCERT Exercise 11.2 Q5

**OR**

Draw a triangle \( ABC \) with side \( BC = 6 \) cm, \( AB = 5 \) cm and \( \angle ABC = 60^\circ. \) Then construct a triangle whose sides are \( 3/4 \) of the corresponding sides of the triangle \( ABC. \)

**Ans:** NCERT Exercise 11.1 Q5

32. Ritu can row downstream 20 km in 2 hours, and upstream 4 km in 2 hours. Find her speed of rowing in still water and the speed of the current.

**Ans:** NCERT Exercise 3.6 Q2(i)

33. The Class X students of a secondary school in Krishinagar have been allotted a rectangular plot of land for their gardening activity. Sapling of Gulmohar are planted on the boundary at a distance of 1m from each other. There is a triangular grassy lawn in the plot as shown in the below figure. The students are to sow seeds of flowering plants on the remaining area of the plot. Taking \( A \) as origin, find the area of the triangle \( PQR \)

**Ans:** NCERT Exercise 7.4 Q5

34. Find the area of the shaded design in the below figure, where \( ABCD \) is a square of side 10 cm and semicircles are drawn with each side of the square as diameter. (Use \( \pi = 3.14 \))

**Ans:** NCERT Areas Related to Circles Example 6 p-234
SECTION – D

Questions 35 to 40 carry 4 marks each.

35. From a point P on the ground the angle of elevation of the top of a 10 m tall building is 30°. A flag is hoisted at the top of the building and the angle of elevation of the top of the flagstaff from P is 45°. Find the length of the flagstaff and the distance of the building from the point P.

Ans: NCERT Trigonometry Example 4 p-200

36. A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

Ans: NCERT Exercise 4.3 Q8

OR

Sum of the areas of two squares is 468 m². If the difference of their perimeters is 24 m, find the sides of the two squares.

Ans: NCERT Exercise 4.3 Q11

37. Prove that “If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio.”

OR

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

38. 200 logs are stacked in the following manner: 20 logs in the bottom row, 19 in the next row, 18 in the row next to it and so on. In how many rows are the 200 logs placed and how many logs are in the top row?

Ans: NCERT Exercise 5.3 Q19

OR

A manufacturer of TV sets produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find : (i) the production in the 1st year (ii) the production in the 10th year (iii) the total production in first 7 years.

Ans: NCERT AP Example 16 p-111

39. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs 500 per m².

Ans: NCERT Exercise 13.1 Q7

OR

A hemispherical tank full of water is emptied by a pipe at the rate of \( 3 \frac{4}{7} \) litres per second. How much time will it take to empty half the tank, if it is 3 m in diameter? (Take \( \pi = \frac{22}{7} \))

Ans: NCERT Surface Areas & Volumes Example 11 p-250

40. Draw more than ogive for the following frequency distribution:

<table>
<thead>
<tr>
<th>Marks</th>
<th>0 – 10</th>
<th>10 – 20</th>
<th>20 – 30</th>
<th>30 – 40</th>
<th>40 – 50</th>
<th>50 – 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of students</td>
<td>5</td>
<td>8</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Also find the median from the graph.
Ans: More than cumulative frequency distribution

<table>
<thead>
<tr>
<th>Marks</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than or equal to 0</td>
<td>41</td>
</tr>
<tr>
<td>More than or equal to 10</td>
<td>36</td>
</tr>
<tr>
<td>More than or equal to 20</td>
<td>28</td>
</tr>
<tr>
<td>More than or equal to 30</td>
<td>22</td>
</tr>
<tr>
<td>More than or equal to 40</td>
<td>12</td>
</tr>
<tr>
<td>More than or equal to 50</td>
<td>6</td>
</tr>
</tbody>
</table>

$n = 41 \Rightarrow n/2 = 20.5$
From the graph, median = 31.8 approximately