Time allotted: 3 Hours   **Maximum Marks: 80**

General Instructions:

i) All the questions are compulsory.
ii) The question paper consists of 40 questions divided into 4 sections A, B, C and D.
iii) Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 8 questions of 3 marks each. Section D comprises of 6 questions of 4 marks each.
iv) There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, three questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
v) Use of calculators is not permitted.

SECTION – A

I   **Q1-Q10 one multiple choice questions. Select the most appropriate answer from the given options:**

1.   The least number which is a perfect square and is divisible by each of 16, 20 and 24 is ………..

   a) 240   b) 1600   c) 2400   d) 3600

2.   Without actually performing the long division, find the number of decimal places for

   $\dfrac{77}{210}$

   a) three decimal places   b) two decimal places
   c) five decimal places   d) non-terminating decimal places

3.   The points (7, 2) and (−1, 0) lie on a line

   a) $7y = 3x - 7$ b) $4y = x + 1$ c) $y = 7x + 7$ d) $x = 4y + 1$

4.   If tan2A = cot (A −18°), where 2A is an acute angle, then the value of A is

   a) 12°   b) 18°   c) 36°   d) 48°

5.   If $sin\theta + cos\theta = \sqrt{2}\ cos\theta, (\theta \neq 90°)$ then the value of tan θ is

   a) $\sqrt{2} - 1$ b) $\sqrt{2} + 1$ c) $\sqrt{2}$ d) $-\sqrt{2}$

6. $(cos^4 A - sin^4 A)$ is equal to

   a) $1 - 2cos^2 A$ b) $2sin^2 A - 1$ c) $sin^2 A - cos^2 A$ d) $2cos^2 A - 1$

7. 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

8. The point on the x-axis which if equidistant from the points A(−2, 3) and B(5, 4) is

   a) (0, 2)   b) (2, 0)   c) (3, 0)   d) (−2, 0)

9. If $A\left(\frac{m}{3}, 5\right)$ is the mid-point of the line segment joining the points Q (−6, 7) and R(−2, 3), then the value of m is

   a) −12   b) −4   c) 12   d) −6

10. The median of a set of 9 distinct observations is 20.5. If each of the largest 4 observation the set is increased by 2, then the median of the new set

   a) is increased by 2   b) is decreased by 2
   c) is two times the original median
   d) Remains the same as that of the original set


Q11-Q15. Fill in the blanks:

11. The total surface area of the given solid figure is _____.
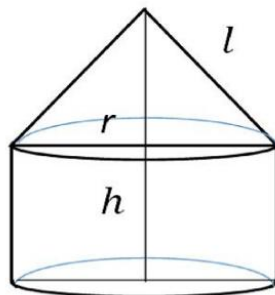
12. If α, β are the zeros of $p(x) = kx^2 - 3x + 2k$ and $\alpha + \beta = \alpha\beta$, the value of k is _____
    (or)
    Write the discriminant of quadratic equation $3\sqrt{2}x^2 - \sqrt{3}x - \sqrt{18} = 0$

13. The perimeter of two similar triangle ABC and PQR are respectively 35 cm and 28 cm. If PQ =12 cm then the value of AB is _____.

14. If $\frac{1+3+5+ ......to\ n\ terms}{2+5+8+ ..\ ...to\ 8\ terms} = 9$, then the value of n is _____.

15. A number is chosen at random from the numbers −5, −4, −3, −2, −1, 0, 1, 2, 3, 4, 5. Then the probability that square of this number is less than or equal to 1 is _____.

Q16-Q20 Answer the following:

16. If the remainder when the integer 'n' is divided by 9 is 7, then find the remainder when 3n -1 is divided by 9.

17. In the given figure $\angle CAB$=90° and $AD \perp BC$. If AC = 25 cm, AB =1 m and

    BD = 2.25 m, find the value of AD.
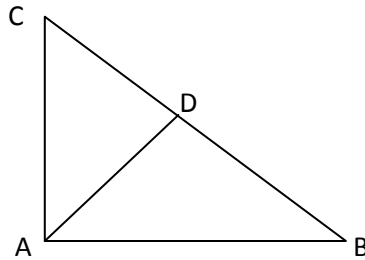
18. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 110°, then find the degree measure of angle POA.

(OR)

If the radii of two concentric circles are 5cm and 13cm, then find the length of the chord of one circle which is tangent to the other circle.

19. Find the number of two-digit numbers divisible by 7.

20. If 1 is a root of the equations $ay^2 + ay + 3 = 0$ and $y^2 + y + b = 0$, then find ab.

SECTION – B

21. Find the number of natural numbers between 102 and 998 which are divisible by 2 and 5 both.

22. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that AB+CD =AD+BC.

23. Triangle ABC is right-angled at B and D is the midpoint of BC. Prove that
    $AC^2 = 4AD^2 - 3AB^2$

(OR)

Diagonals of a trapezium ABCD with $AB \parallel CD$ intersect each other at the point O. If AB=2CD, find the ratio of the areas of triangle AOB and COD.

24. A tree breaks due to storm and the broken part bends, so that the top of the tree touches the ground making an angle of 30° with the ground. The distance between the foot of the tree to the point where the top touches the ground is 8m.

    Based on the above situation, answer the following:
    i) Find the height of the tree.
    ii) At what height the tree is broken.

25. Savitha and Hamid are friends, what is the probability that both will have

    i) different birthdays?

ii) the same birthday? (non leap year)

(OR)

A Card is drawn at random from a well shuffled pack of 52 cards. Find the probability that the card drawn is neither a red card nor a queen.

26. Sudhir runs a juice shop, he sales the juice in glasses of 2 different shapes, radius of each glass is 4 cm and height is 15 cm. (use $\pi = 3.14$)

Type A: A Glass with hemispherical raised bottom.

Type B: A glass with conical raised bottom of height 0.5 cm.

Sudhir decided to serve juice to the customer, in the glass of type B. Is it profit or loss by serving in type B glass? If yes, how much?

SECTION - C

27. Show that one and only one out of p, p + 2 or p + 4 is divisible by 3, where p is any positive integer.

(OR)

Prove that $\sqrt{5}$ is irrational

28. If the sum of first m terms of an AP is *n* and the sum of first n terms is *m* then show that the sum of its first (m+n) terms is $-$ (m + n).

29. Solve the following by cross – multiplication

$$2(ax - by) + (a + 4b) = 0 \quad ; \quad 2(bx + ay) + (b - 4a) = 0$$

(OR)

In the figure ABCDE is a pentagon with $BE \parallel CD$ and $BC \parallel DE$. BC is perpendiciter to CD. AB = 5 cm, AE = 5cm, BE = 7 cm, BC = $x - y$ and CD = $x + y$. If the perimeter of ABCDE is 27 cm, find the value of x and y, given $x, y \neq 0$
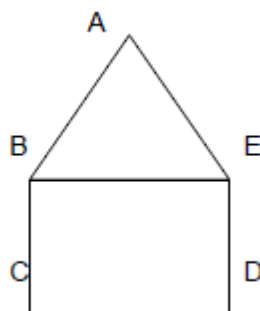
30. Find the values of p and q so that $x^4 + x^3 + 8x^2 + px + q$ is divisible by $x^2 + 1$.

31. School students of class 10 undertake to work for the campaign

    "SAY NO TO PLASTIC". Group X took the area under the coordinates A (2, 2), B (−3, 3), C (−2, −1) and Group Y took the area under the coordinates C (−2, −1), D (3, −1), A(2, 2)

    i) Which group covered more area?

    ii) What is the difference between them in area?

32. If $\sin\theta = \frac{m}{n}$, find the value of $\frac{tan\theta + 4}{4cot\theta + 1}$

    (OR)

    Evaluate

    $$\frac{cos^2(45°+\theta) + cos^2(45°-\theta)}{\tan(60°+\theta)\ \tan(30°-\theta)} + (cot30° + sin90°) \times (tan60° - sec0°)$$

33. Find the difference of the areas of two segments of a circle formed by a chord of length 5cm subtending an angle of 90° at the centre.

34. The following table shows the ages of the patients admitted in a hospital during a year.

Age (in years)	5 – 15	15 – 25	25 – 35	35 – 45	45 – 55	55 - 65
No. of patients	6	11	21	23	14	5

    Find the mode and the mean of the data given above. Compare and interpret the two measures of central tendency.

SECTION – D

35. Draw a triangle ABC with side BC=7cm, $\angle B = 45°, \angle A = 105°$. Then construct a triangle whose sides are $\frac{4}{3}$ times the corresponding side of triangle ABC.

    (OR)

    Let ABC be a triangle in which AB=6cm, BC = 8 cm and $\angle B = 90°$. BD is the perpendicular from B on AC. The circle through B, C, D is drawn. Construct the tangents from A to this circle.

36. ABC is a right triangle, right angled at C. If p is the length of the perpendicular from C to AB and a, b, c have the usual meaning, then prove that

    i) cp = ab

    ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

37. Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours. less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

(OR)

Solve for x

$\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}, x \neq -1, -2, -4$

38. A solid cone of height 12cm and base radius 6 cm has the top 4 cm removed. Find the whole surface of the remaining frustum of the cone.

(OR)

A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4cm. Find the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference of the volumes of the cylinder and the toy (use $\pi = 3.14$)

39. A man on the deck of a ship 14m above water level, observes that the angle of elevation of the top of a cliff is 60° and the angle of depression of the base of the cliff in 30°. Calculate the distance of the cliff from the ship and the height of the cliff

$\left(Use \ \sqrt{3} = 1.732\right)$

40. Draw a 'more than ogive' and 'less than ogive' for the following data:

Marks	No. of students
Less than 20	0
Less than 30	4
Less than 40	16
Less than 50	30
Less than 60	46
Less than 70	66
Less than 80	82
Less than 90	92
Less than 100	100

Find the median from the graph.

****