Class : X   Max Marks:80
Subject : MATHEMATICS   Time Allotted: 3 hrs

Instructions:

1. All questions are compulsory.

2. The question paper consists of 30 questions. Section – A comprises of 6 questions of 1 mark each, Section – B comprises of 6 questions of 2 marks each, Section – C comprises of 10 questions of 3 marks each and Section – D comprises of 8 questions of 4 marks each.

3. Use of calculator is not permitted.

Section – A

1. Explain why 3 X 5 X 7 + 7 is a composite number?

2. If α and $\frac{1}{\alpha}$ are the zeroes of the polynomial $4x^2 – 2x + (k – 4)$, find the value of k.

3. Is 0 a term of the AP: 31, 28, 25,….? Justify your answer.

4. What is the distance between two parallel tangents of a circle of radius 4 cm?

5. For what value of x, the mode of the following data is 7 ?
   3, 5, 6, 7, 5, 4, 7, 5, 6, x, 8, 7

6. A die is thrown once. What is the probability of getting a composite number?
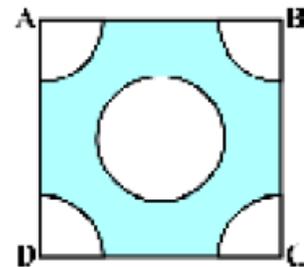
Section – B

7. Prove that $4 - 5\sqrt{3}$ is irrational.

8. Find a quadratic polynomial whose zeroes are $3 + \sqrt{2}$ and $3 - \sqrt{2}$.

9. For what values of k, will the following system of linear equations have infinitely many solutions: 2x + 3y = 4; (k + 2)x + 6y = 3k + 2

10. Find the ratio in which the point (x, 1) divides the line segment joining the points (- 3, 5) and (2, - 5). Also find the value of x.

11. Find the value of tan 60° geometrically.

12. The weekly observation on cost of living index in a certain city for the year 2000-2001 are given below. Compute the mean weekly cost of living index.

Cost of living index(in ₹)	140-150	150-160	160 -170	170-180	180-190	190-200
Number of weeks	5	10	20	9	6	2

Section – C

13. Find the HCF of 384 and 26 and express it as the linear combination of 384 and 26.

14. Two years ago a man's age was three times the square of his son's age. Three years hence, his age will be four times his son's age. Find their present ages.

15. 150 workers were engaged to finish a work in a certain number of days. Four workers were dropped the second day, four more were dropped the third day and so on. It takes 8 more days to finish the work now. Find the number of days in which the work was completed.

16. Prove that the area of the equilateral triangle described on the side of a square is half the area of the equilateral triangle described on its diagonal.

17. Two tangents drawn to a circle with centre O, from a point P. If OP is equal to the diameter of the circle, show that ∆APB is equilateral.

18. Prove that: $\dfrac{Sec\,\theta + \tan\theta - 1}{\tan\theta - \sec\theta + 1} = \dfrac{\cos\theta}{1 - \sin\theta}$

19. The angle of elevation of the top of a tower from a certain point is 30°. If the observer moves 20m towards the tower, the angle of elevation of the top increases by 15°. Find the height of the tower.

20. All kings, queens and aces are removed from a pack of 52 cards. The remaining cards are well-shuffled and then a card is drawn from it. Find the probability that the drawn card is:
    (i) A face card.
    (ii) A card of hearts.
    (iii) A black card.

21. A solid iron cuboidal block of dimensions 4.4 m X 2.6 m X 1 m is recast into hollow cylindrical pipe of internal radius 30 cm and thickness 5 cm. Find the length of the pipe.

22. From each corner of a square of side 4 cm a quadrant of a circle of radius 1 cm is cut and also a circle of diameter 2 cm is cut as shown in the figure. Find the area of the remaining portion of the square.

Section – D

23. Solve the following system of equations graphically:
    $4x - 5y - 20 = 0$; $3x + 5y - 15 = 0$
    Determine the vertices of the triangle formed by the lines representing the above equations and the y – axis.

24. Solve the equation: $4\left(x - \frac{1}{x}\right)^2 - 4\left(x + \frac{1}{x}\right) + 1 = 0$

25. Find the area of a quadrilateral ABCD whose vertices are A(1,0), B(5,3), C(2,7) and D(- 2,4).

26. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

27. Draw a circle of radius 4 cm. Construct a pair of tangents to it, the angle between which is 60°. Also justify the construction. Measure the distance between the centre of the circle and the point of intersection of the tangents.

28. The angle of elevation and depression of the top and bottom of a lighthouse from the top of a 60 m high building are 30° and 60° respectively. Find:
    (i) The difference between the heights of the lighthouse and the building.
    (ii) The distance between the lighthouse and the building.

29. Compute the median from the marks obtained by the students of class X.

Marks	40 – 49	50 – 59	60 – 69	70 – 79	80 – 89	90 – 99
No. of students	5	10	20	30	20	15

30. A bucket open at the top and made up of a metal sheet is in the form of a frustum of a cone. The depth of the bucket is 24 cm and the diameters of its upper and lower circular ends are 30 cm and 10 cm respectively. Find the cost of metal sheet used in it at the rate of ₹10 per 100 cm².