Class: X   Max. Marks: 100.
Sub: Mathematics   Max. Time: 3 hrs.
Instructions: -
  ➢ All questions are compulsory.
  ➢ This question paper consists of 25 questions divided into three sections A (Q 1 to 10 each carries 3 marks) Section B (Q 11 to 20 each carries 4 marks) and Section C (Q. 21 to 25 each carries 6 marks.)
  ➢ Write down the serial number of the question before attempting it.

Answer the following questions.

1. In a right triangle ABC, right angled at A, AD is drawn perpendicular to BC. Prove that $AB^2 - BD^2 = AC^2 - CD^2$.

2. Solve $\dfrac{Cos^2A - 3\,CosA + 2}{Sin^2A} = 1$

3. Find the value of 'k' so that the roots of the quadratic equation $(k+1)x^2 + 2kx + 4 = 0$ is equal to the product of the roots.

4. In triangle PMN AB∥MN if PA = x—2 , PM = x, PB = x—1 and PN = x +2 find the value of 'x '.

5. Prove that $\dfrac{\tan\theta}{\sec\theta - 1} + \dfrac{\tan\theta}{\sec\theta + 1} = 2\,Cosec\,\theta$

6. Find the LCM of $3 + 13x - 30x^2$ and $25x^2 - 30x + 9$.

7. If 7 times of seventh term of an A.P is 11 times the eleventh term, show that the 18th term of A.P is zero.

8. Find the ratio in which the points (2,5) divides the line-segment joining the points (-1,2) and (4,7).

9. A bag contains 3 red balls, 5 black balls, and 4 white balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is 1) white 2) red 3) black?

10. What should be subtracted from the expression $\dfrac{5x + x - 1}{x + 1}$ to get $\dfrac{1 - 2x + x}{x - 1}$.

11. The mean of the following data is 20.5. Find the missing frequency.

X	10	15	20	25	30
f	5	7	---	12	6

12. If α and β are the roots of equation $2x^2 + 5x - 6 = 0$. Find the value of $\alpha\beta + \beta\alpha$.

13. Find graphically the vertices of the triangle whose sides have the equations.   2y-x = 8; 5y – x = 14; y – 2x = 1.

14. State and prove alternate segment theorem

15. Solve for $\sqrt{2x^2 - 9x + 4} + 3\sqrt{4x - 1} = \sqrt{2x^2 - 21x - 11}$.

16. a, b,c are in AP. Prove that b+c, c+a and a +b are in AP.

17. An Aero plane flying horizontally at height of $2500\sqrt{3}$ mts above that ground; is observed to be at angle of elevation 60^0 from the ground. After a flight of 25 seconds the angle of elevation is 30^0. Find the speed of the plane in m/sec.

18. O is any point in the interior of rectangle ABCD. Prove that $OB^2 + OD^2 = OC^2 + OA^2$.

19. AB and CD are two chords of circle such that AB = 10cm; CD = 24 cm and AB∥CD. The distance between AB and CD is 17cm. find the radius of the circle.

20. Given that one root of quadratic equation $ax^2 + bx + c = 0$ is three times of other. Show that $3b^2 = 16ac$.

21. Prove that $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta) + 1 = 0$

22. Prove that three times of sum of the squares of sides of triangle is equal to four times of sum of squares of medians.
23. a) Determine the AP whose third term is 16 and the deference if 5 th from 7 th term is 12.
    b). Determine, whether given points are vertices of right triangle: (10,-18) (3,6) (-5,6)

24. Solve for x: $(x-3)(x+9)(x-7)(x+5) = 1680$

25. The annual income of Mukergy (excluding HRA) is Rs 2, 25,000. He contributes Rs 1500 per month in his P.F and pays an annual premium of Rs 8,000 towards his L.I.C Policy. He donated 2000 charitable trust which gets 100% relief. Calculate the income tax paid by Mukergy in last month of the year if his earlier deductions for 11 months for income tax were at the rate of Rs 800 per month.

Assume the following for computing income tax:

a) Standard Deduction   1/3 of the total income subject to a maximum of 25000.

b) Rates of Income tax:

Slab	Income tax
1. Up to Rs. 50,000	No tax
2. From Rs 50,001 to Rs 60,000	10% of the amount above Rs Exceeding 50,000.
3. From Rs 60,001 to Rs 150,000	Rs. 1,000 + 20% of the amount Exceeding Rs. 60,000
4. Above the 1,50,000	19000 + 30% of exceeding 150,000.

c). Rebate in tax   20% of the total annual savings subject to a maximum of Rs 12,000.

d) surcharge;   5% of net tax,