1 Mark

1. Find the value of p for which the equation $px^2 + 4x + 1 = 0$ has real roots

2. Find the solution of $2 - x = \dfrac{x - 2}{x}$

3. Find the common root of the equations $x^2 - 7x + 10 = 0$ and $x^2 - 10x + 16 = 0$

4. The roots of $2x^2 - 6x + 7 = 0$ are_____

5. Find the value of k for which $9x^2 + 3kx + 4 = 0$ has real and equal roots.

6. If the product of the roots of $x^2 - 3x + k = 10$ is -2, then find the value of k

7. Find the nature of the roots of the quadratic equation $2x^2 - 6x + 3 = 0$.

8. If the equation $x^2 + 4x + k = 0$ has real root, then find the value of k

9. If the roots of $ax^2 + bx + c = 0$ be equal, then the value of c

10. If the equation $x^2 + 2(k + 2)x + 9k = 0$ has equal roots, then find the value of k.

11. If the given equation $x^2 - 6x + 45 = 100$, then find the value of x.

12. If the sum and product of roots of an equation $3x^2 + (2k + 1)x - 5 = 0$ are same, then the value of k?

13. If the equation $ax^2 - 5x + c = 0$ has 10 as the sum of roots and product of the roots also, which of the following is true?

    (a) $a = \dfrac{1}{2}, c = 5$

    (b) $a = 5, c = \dfrac{1}{2}$

    (c) $a = 2, c = 3$

    (d) $a = 3, c = 2$

14. If one root of the equation $3x^2 - 10x + 3 = 0$ is $\dfrac{1}{3}$, then find other root.

15. If α, β be the roots of $ax^2 + bx + c = 0$, then find the value of $\alpha^2 + \beta^2$.

16. If α, β are the roots of the equation $x^2 - px + q = 0$, then find the value of $\alpha^2 + \beta^2$.

17. If α, β are the roots of the equation $x^2 - 5x + 6 = 0$, find the value of $\alpha^2 - \beta^2$.
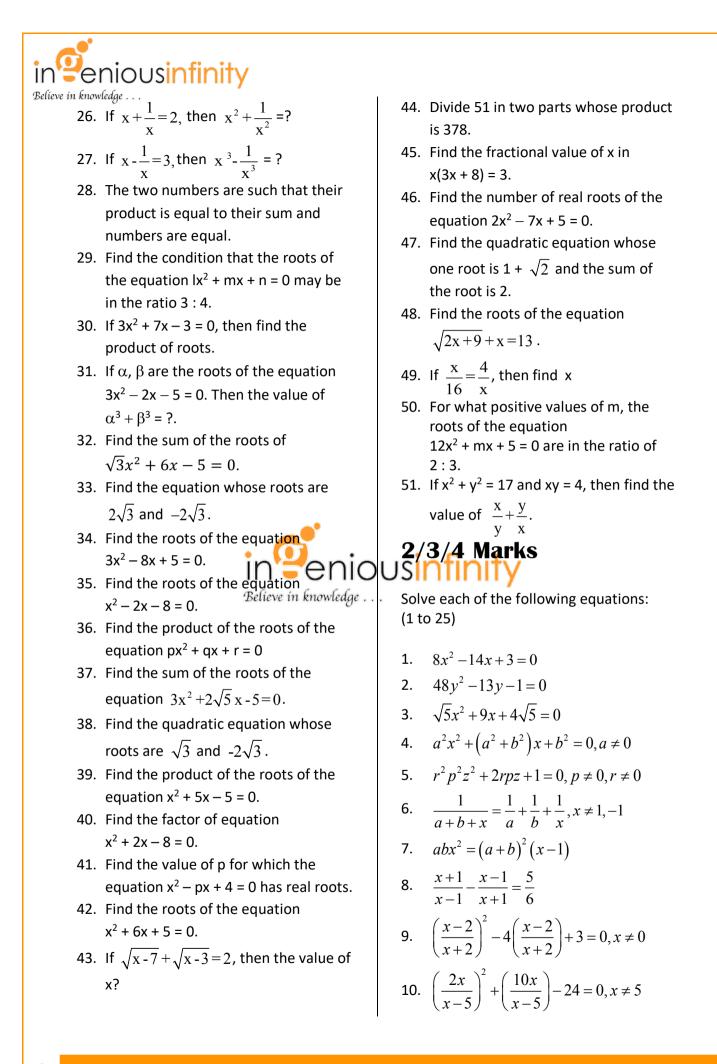
18. If α, β are the roots of $x^2 + px + q = 0$, then the value of $\dfrac{\alpha}{\beta} + \dfrac{\beta}{\alpha}$.

19. If α, β are the roots of the equation $2x^2 - 3x + 1 = 0$, then find the equation whose roots are $\dfrac{\alpha}{\beta}$ and $\dfrac{\beta}{\alpha}$

20. If one root of $5x^2 + 13x + k = 0$ be the reciprocal of the other root then the value of k?

21. Find the zeros of the polynomial $x^3 - 6x^2 + 11x - 6$.

22. Find the roots of $x^2 - 7x - 8 = 0$.

23. Find the nature of the roots of quadratic equation $x^2 - 8x + 16 = 0$

24. Find the quadratic equation whose roots are $\sqrt{7}$ and $-\sqrt{7}$.

25. If equation $x^2 + px + 4 = 0$ has one root is 2, then value of p?

26. If $x + \dfrac{1}{x} = 2$, then $x^2 + \dfrac{1}{x^2} = ?$

27. If $x - \dfrac{1}{x} = 3$, then $x^3 - \dfrac{1}{x^3} = ?$

28. The two numbers are such that their product is equal to their sum and numbers are equal.

29. Find the condition that the roots of the equation $lx^2 + mx + n = 0$ may be in the ratio 3 : 4.

30. If $3x^2 + 7x - 3 = 0$, then find the product of roots.

31. If α, β are the roots of the equation $3x^2 - 2x - 5 = 0$. Then the value of $\alpha^3 + \beta^3 = ?$.

32. Find the sum of the roots of $\sqrt{3}x^2 + 6x - 5 = 0$.

33. Find the equation whose roots are $2\sqrt{3}$ and $-2\sqrt{3}$.

34. Find the roots of the equation $3x^2 - 8x + 5 = 0$.

35. Find the roots of the equation $x^2 - 2x - 8 = 0$.

36. Find the product of the roots of the equation $px^2 + qx + r = 0$

37. Find the sum of the roots of the equation $3x^2 + 2\sqrt{5}x - 5 = 0$.

38. Find the quadratic equation whose roots are $\sqrt{3}$ and $-2\sqrt{3}$.

39. Find the product of the roots of the equation $x^2 + 5x - 5 = 0$.

40. Find the factor of equation $x^2 + 2x - 8 = 0$.

41. Find the value of p for which the equation $x^2 - px + 4 = 0$ has real roots.

42. Find the roots of the equation $x^2 + 6x + 5 = 0$.

43. If $\sqrt{x-7} + \sqrt{x-3} = 2$, then the value of x?

44. Divide 51 in two parts whose product is 378.

45. Find the fractional value of x in $x(3x + 8) = 3$.

46. Find the number of real roots of the equation $2x^2 - 7x + 5 = 0$.

47. Find the quadratic equation whose one root is $1 + \sqrt{2}$ and the sum of the root is 2.

48. Find the roots of the equation $\sqrt{2x+9} + x = 13$.

49. If $\dfrac{x}{16} = \dfrac{4}{x}$, then find x

50. For what positive values of m, the roots of the equation $12x^2 + mx + 5 = 0$ are in the ratio of 2 : 3.

51. If $x^2 + y^2 = 17$ and $xy = 4$, then find the value of $\dfrac{x}{y} + \dfrac{y}{x}$.

2/3/4 Marks

Solve each of the following equations: (1 to 25)

1. $8x^2 - 14x + 3 = 0$

2. $48y^2 - 13y - 1 = 0$

3. $\sqrt{5}x^2 + 9x + 4\sqrt{5} = 0$

4. $a^2x^2 + (a^2 + b^2)x + b^2 = 0, a \neq 0$

5. $r^2 p^2 z^2 + 2rpz + 1 = 0, p \neq 0, r \neq 0$

6. $\dfrac{1}{a+b+x} = \dfrac{1}{a} + \dfrac{1}{b} + \dfrac{1}{x}, x \neq 1, -1$

7. $abx^2 = (a+b)^2 (x-1)$

8. $\dfrac{x+1}{x-1} - \dfrac{x-1}{x+1} = \dfrac{5}{6}$

9. $\left(\dfrac{x-2}{x+2}\right)^2 - 4\left(\dfrac{x-2}{x+2}\right) + 3 = 0, x \neq 0$

10. $\left(\dfrac{2x}{x-5}\right)^2 + \left(\dfrac{10x}{x-5}\right) - 24 = 0, x \neq 5$

11. $\sqrt{\dfrac{x}{x-1}} + \sqrt{\dfrac{x-1}{x}} = \dfrac{13}{6}, x \neq 0, 1$

12. $\left(x^2 - x\right)^2 + 5\left(x^2 - x\right) + 6 = 0$

13. $\left(x^2 - 3x\right)^2 - 16\left(x^2 - 3x\right) - 36 = 0$

14. $\left(y^2 + 5y + 7\right)^2 - 4\left(y^2 + 5y + 7\right) + 3 = 0$

15. $(x+1)(x+2)(x+3)(x+4) = 24$

16. $(x+1)(x+3)(x-4)(x-6) + 48 = 0$

17. $(x+4)(x-5)(x+6)(x-7) = 504$

18. $x - \sqrt{3x - 6} = 2$

19. $3^{x-2} + 3^{3-x} = 4$

20. $2^{2x} + 32 - 3.2^{x+2} = 0$

21. $7^{x+1} + 7^{1-x} - 50 = 0$

22. $2^{2x+3} - 9.2^x + 1 = 0$

23. $16.4^{x+2} - 16.2^{x+2} + 1 = 0$

24. $9^{x+2} - 6.3^{x+1} + 1 = 0$

25. $5^{4x} - 3.5^{2x+1} = 250$

26. Find the value of k so that each of the following quadratic equations has equal roots:

    (i) $kx^2 - 5x + k = 0$

    (ii) $x^2 + k(4x + k - 1) + 2 = 0$

    (iii) $x^2 + 7(3 + 2k) - 2x(1 + 3k) = 0$

    (iv) $(k - 12)x^2 + 2(k - 12)x + 2 = 0$

    (v) $4x^2 - 2(k + 1)x + k + 4 = 0$

    (vi) $x^2 - 2(k + 1)x + k^2 = 0$

27. If the roots of quadratic equation $ax^2 + bx + c = 0$ are equal then show that $b^2 = 4ac$.

28. Find the value of k such that the sum of the squares of the roots of the quadratic equation $x^2 - 8x + k = 0$ is 40.

29. If -4 is a root of the quadratic equation $x^2 + px - 4 = 0$ and quadratic equation $x^2 + px + k = 0$ has equal roots. Find the value of k.

30. One root of the equation $2x^2 - 8x - m = 0$ is $\dfrac{5}{2}$. Find the other root and value of m.

31. Find the value of k such that quadratic equation $x^2 - (k + 6)x + 2(2k - 1) = 0$ has sum of the roots as half of their product.

32. If the sum and product of the roots of the quadratic equation $ax^2 - 5x + c = 0$ are both equal to 10, find the value of a and c.

33. Find the value of k so that the sum of the roots of the quadratic equation $(k + 1)x^2 + (2k + 1)x - 9 = 0, k + 1 \neq 0$ is equal to the product of the roots.

34. Find the value of k so that the sum of the roots of the equation $3x^2 + (2k + 1)x - (k + 5) = 0$ is equal to the product of the roots.

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

36. Two numbers m and n are such that the quadratic equation $mx^2 + 3x + 2n = 0$ has -6 as the sum of the roots and also the product of the roots. Find m and n.

37. Form a quadratic equation one of whose roots is $2 + \sqrt{5}$ and sum of the roots is 4.

38. Construct a quadratic equation whose roots are $\dfrac{1 + \sqrt{5}}{4}$ and $\dfrac{1 - \sqrt{5}}{4}$.

39. Discuss the nature of the roots of the equation $x^2 - 5x - 7 = 0$.

40. A two digit number is such that the product of the digit is 14. When 45 is added to the number, then the digit are reversed. Find the number.

41. The sum of the squares of two consecutive natural numbers is 313. Find the numbers.

42. The sides of the square exceed the sides of another square by 4cm and the sum of the areas of the square is 400 cm^2. Find the dimensions of the squares.

43. Find the two consecutive numbers whose squares have the sum 85

44. The sum of the squares of two numbers is 130. The sum of smaller number and twice the larger number is 25. Find the numbers.

45. The length of the prayer hall is 3m more than its width. If the area of the hall is 36 m^2, find the length and width of the hall.

46. The hypotenuse of a right angled triangle is 20m. If the difference between the lengths of other sides is 4m, find the other side.

47. The hypotenuse of right angled triangle is 6m more than twice the shortest side. If the third side is 2m less than the hypotenuse, find the sides of the triangle.

48. A person on tour has Rs.360 for his daily expenses. If he has exceeds his tour programme by 4 days, he must cut down his daily expenses by Rs.3 per day. Find the number of days of his tour programme.

49. The sum of ages (in years) of a son and his father is 35 and product of their ages is 150. . Find their ages.

50. A shopkeeper buys a number of books for Rs.80. If he had bought 4 more books for the same amount, each book would have cost him Re 1 less. How many books should he buy?

51. In flight of 600km an aircraft was slowed down due to bad weather. Its average speed for the trip was reduces by 200km/hr and the time of flight increases by 30 minutes. Find the duration of the flight.

52. The angry Arjun carried some arrows for fighting with Bheeshm. With half of the arrows he cut down the arrows thrown by Bheeshm on him and with six other arrows he killed the rath driver of Bheeshm. With one arrow each he knocked down respectively the rath, flag and bow of Bheeshm. Finally with one more than four times the square root of arrows he laid Bheeshm unconscious on an arrow bed. Find the total number of arrows Arjun had.

53. A piece of cloth costs Rs.200. If piece were 5m longer and each meter of cloth cost Rs.2 less, the cost of piece would have remained unchanged. How long is the piece and what is its original rate per meter?

54. Rs.6500 was divided equally among a certain number of persons. Had there been 15 more persons, each would have got Rs.30 less. Find the original number of persons.

55. An express train makes a run of 240km at certain speed. Another train whose speed is 12km/h less takes an hour longer to cover the same distance. Find the speed of the express train in km/h.

56. In a flight of 2800 km, an aircraft was slowed down due to bad weather. Its average speed was reduced by 100km/h and time increased by 30 minutes. Find the original duration of flight.

57. The area of the rectangle gets reduced by 80 sq units if its length is reduced by 5 units and breath is increased by 2 units. If we increase the length by 10 units and decrease the breath by 5 units the area is increased by 50 sq units. Find the length and breadth of the rectangle.

58. A plane left 30 minutes later than the scheduled time and in order to reach the destination 1500 km away in time, it has to increase the speed by 250 km/h from the usual speed. Find its usual speed.

59. Solve: $\dfrac{4}{x} - 3 = \dfrac{5}{(2x+3)}, x \neq 0, -\dfrac{3}{2}$.

60. Solve by using quadratic formula:
$12abx^2 - (9a^2 - 8b^2)x - 6ab = 0$

61. Solve by using quadratic formula:
$a^2 b^2 x^2 + b^2 x - a^2 x - 1 = 0$

62. Solve for x:
$\dfrac{a}{(ax-1)} + \dfrac{b}{(bx-1)} = (a+b), \ x \neq \dfrac{1}{a}, \dfrac{1}{b}$

63. If the roots of the equation $(a-b)x^2 + (b-c)x + (c-a) = 0$ are equal, prove that $b + c = 2a$

64. If the equation $(1+m^2)x^2 + 2mcx + (c^2 - a^2) = 0$ has equal roots, prove that $c^2 = a^2(1 + m^2)$

65. If the roots of the equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + (b^2 - ac) = 0$ are real and equal, show that either $a = 0$ or $(a^3 + b^3 + c^3) = 3abc$

66. The difference of squares of two numbers is 180. The square of the smaller number is 8 times the larger number. Find the two numbers.

67. Seven years ago Varun's age was five times the square of Swati's age. Three years hence Swati's age will be two-fifth of Varun's age. Find there present ages.

68. A takes 6 days less than the time taken by B to finish a piece of work. If both A and B together can finish it in 4 days, find time taken by B to finish the work.

69. Find three consecutive positive integers such that the sum of the square of the first and the product of the other two is 154.

70. The sum of the number and its reciprocal is $3\dfrac{41}{80}$. Find the number.

71. The product of Meena's age (in years) 5 years ago and her age 8 year later is 30. Find her present age.

72. A farmer prepares a rectangular vegetable garden of area 180 m^2. With 39m of barbed wire, he can fence the three sides of the garden leaving one of the longer sides unfenced. Find the dimensions of the garden.

73. A teacher on attempting to arrange the students for mass drill in the form of solid square found that 24 students were left. When he increased the size of square by one student, he found that he was short of 25 students. Find the number of students.

74. Out of a number of saras birds, one-fourth of the number are moving about in lotus, $\dfrac{1}{9}th$ coupled with $\dfrac{1}{4}th$ as well as 7 times the square root of the number move on a hill, 56 birds

remain in vakula trees. What is the total number of birds.

75. The hypotenuse of right triangle is $3\sqrt{10}cm$. If the smaller side is tripled and the longer side is doubled, new hypotenuse will be $9\sqrt{5}cm$. How long are the sides of the triangle?

76. If roots of the equation $\left(a^2+b^2\right)x^2-2\left(ac+bd\right)x+\left(c^2+d^2\right)=0$ are equal, prove that $\dfrac{a}{b}=\dfrac{c}{d}$.

77. Solve by factorization:
$$\dfrac{x-a}{x-b}+\dfrac{x-b}{x-a}=\dfrac{a}{b}+\dfrac{b}{a}$$

78. Solve by factorization:
$$\left(\dfrac{m}{n}\right)x^2+\left(\dfrac{n}{m}\right)=1-2x$$

79. Solve by factorization:
$$ad^2x\left(\dfrac{a}{b}x+\dfrac{2c}{d}\right)+c^2b=0$$

80. A chess board contains 64 equal squares and the area of each square is 6.25 cm^2. A boarder round the board is 2cm wide. Find the length of the side of the chess board.

81. A peacock is sitting on the top of a pillar which is 9m high from a point 27m away from the bottom of the pillar a snake is coming to its hole at the base of the pillar. Seeing the snake, peacock pounces on it. If their speeds are equal, at what distance from the hole is the snake caught?

82. Solve by using factorization:

(a) $4x^2-4a^2x+\left(a^4-b^4\right)=0$

(b) $x^2+\left(\dfrac{a}{a+b}+\dfrac{a+b}{a}\right)x+1=0$

(c) $x=\dfrac{1}{2-\dfrac{1}{2-\dfrac{1}{2-x}}}$

83. The sum of the areas of two squares is 468 m^2. If difference of there perimeter is 24m. Find the sides of two square.

84. A dealer sells a toy for Rs.24 and gains as much percent as the cost price of the toy. Find cost price of the toy.

85. Solve: $x=\sqrt{6+\sqrt{6+\sqrt{6+......}}}$

86. The hypotenuse of right triangle is 20m. If difference between the length of other sides is 4m. Find the sides.

87. Find the value of a if the quadratic expression $x^2-\left(a-1\right)x+\left(a+\dfrac{1}{4}\right)$ is a perfect square.

88. If the roots x_1 and x_2 of the quadratic equation $x^2-2x+c=0$ is such that $7x_2-4x_1=47$ then find the value x_1, x_2 and c.

Answers
1 Mark

1. $p \le 4$
2. 2, - 1
3. 2
4. Imaginary
5. $k = \pm 4$
6. 8
7. Real, unequal, rational
8. $k \le 4$
9. $\dfrac{b^2}{4a}$
10. 1, 4
11. 11, - 5
12. 2
13. $a = \dfrac{1}{2}, c = 5$
14. 3
15. $\dfrac{b^2-2ac}{a^2}$
16. $p^2 - 2q$
17. ± 5

18. $\frac{p^2 - 2q}{q}$

19. $2x^2 - 5x + 2 = 0$

20. 1

21. 1, 2, 3

22. -1, 8

23. Two equal and rational roots

24. $x^2 - 7 = 0$

25. -4

26. 2

27. 36

28. 2, 2

29. $12m^2 = 49nl$

30. -1

31. $\frac{98}{27}$

32. $-2\sqrt{3}$

33. $x^2 - 12 = 0$

34. $\frac{5}{3}, 1$

35. $4, -2$

36. $-\frac{p}{q}$

37. $\frac{-2\sqrt{5}}{3}$

38. $x^2 + \sqrt{3}x - 6 = 0$

39. -5

40. $(x - 4)(x - 2)$

41. $p^2 \geq 16$

42. Real and unequal

43. 7

44. 42, 9

45. $\frac{1}{3}$

46. 2

47. $x^2 - 2x - 1 = 0$

48. 8

49. ± 8

50. $5\sqrt{10}$

51. $\frac{17}{4}$

2/3/4 Marks

1. $\frac{1}{4}, \frac{3}{2}$

2. $\frac{1}{3}, -\frac{1}{16}$

3. $-\sqrt{5}, -\frac{4}{\sqrt{5}}$

4. $-1, -\frac{b^2}{a^2}$

5. $-\frac{1}{rp}$

6. $-a, -b$

7. $\frac{a+b}{a}, \frac{a+b}{b}$

8. 5

9. -4

10. $15, 4$

11. $\frac{9}{5}, -\frac{4}{5}$

12. *No solution*

13. $1, 2, -3, 6$

14. $-4, -1$

15. $0, -5$

16. $\frac{3 + \sqrt{57}}{2}, \frac{3 - \sqrt{57}}{2}$

17. $-2, 3, -7, 8$

18. $5, 2$

19. 2

20. $2, 3$

21. $1, -1$

22. $0, -3$

23. -4

24. -2

25. 1

26. $(i) \pm \frac{5}{2} (ii) \frac{2}{3} or -1 (iii) 2, -\frac{10}{9} (iv) 14 (v) 5 or -3 (vi) -\frac{1}{2}$

28. 12

29. $\frac{9}{4}$

30. $\frac{3}{2}, m = -\frac{15}{2}$

31. 7

32. $a = \dfrac{1}{2}, c = 5$

33. 4

34. 4

36. $m = \dfrac{1}{2}, n = -\dfrac{3}{2}$

37. $x^2 - 4x - 1 = 0$

38. $4x^2 - 2x - 1 = 0$

39. $Real \& unequal$

40. 27

41. 12,13

42. $12cm, 16cm$

43. 6,7

44. $3,11 \, or \, 7,9$

45. $l = 7.7cm, b = 4.7cm$

46. $16m, 12m$

47. $10m, 24m, 26m$

48. $20 \, days$

49. $son = 5 years, father = 30 years$

50. 16

51. $1 hour$

52. 100

53. $length = 20m, Rate = Rs.10/m$

54. 50

55. $60km/h$

56. $3h 30 \min$

57. $l = 40 units, b = 30 units$

58. $750 km/hr$

59. $x = -2, 1$

60. $x = \dfrac{3a}{4b}, x = -\dfrac{2b}{3a}$

61. $x = -\dfrac{1}{a^2}, x = \dfrac{1}{b^2}$

62. $x = \dfrac{a+b}{ab}, x = \dfrac{2}{a+b}$

66. $18 \& 12 \, or \, 18 \& -12$

67. 27,9

68. $12 days$

69. 8,9,10

70. $\dfrac{16}{5} \, or \, \dfrac{5}{16}$

71. $7 years$

72. $l = 15m, b = 12m$

73. 600

74. 576

75. $3cm, 9cm$

77. $0, a+b$

78. $-\left(\dfrac{n \pm \sqrt{mn}}{m} \right)$

79. $-\dfrac{bc}{ad}$

80. $24cm$

81. 12m

82. (a) $x = \dfrac{a^2 + b^2}{2}, x = \dfrac{a^2 - b^2}{2}$

 (b) $x = \dfrac{-a}{a+b}, x = \dfrac{-a+b}{a}$

 (c) $x = 1,1$

83. 18m & 12m

84. Rs.20

85. $x = 3$

86. 12m & 16m

87. $a = 0, a = 6$

88. $x_1 = 5, x_2 = -3, c = -15$

By **Arun Kumar Shukla**