Practice Exercise

Level - I

1. Which of the following is a quadratic equation ?

   (a) $x^{\frac{1}{2}} + 2x + 3 = 0$

   (b) $(x-1)(x+4) = x^2 + 1$

   (c) $x^4 - 3x + 5 = 0$

   (d) $(2x+1)(3x-4) = 2x^2 + 3$

2. Solve $x - \dfrac{1}{x} = 1\dfrac{1}{2}$

   (a) $-\dfrac{1}{2}, 2$ 　　　　　(b) $\dfrac{1}{2}, 2$

   (c) $\dfrac{1}{2}, \dfrac{2}{3}$ 　　　　　(d) None of these

3. If $2x^2 - 7xy + 3y^2 = 0$, then the value of $x : y$ is

   (a) $3 : 2$ 　　　　　(b) $2 : 3$

   (c) $3 : 1$ or $1 : 2$ 　　　　　(d) $5 : 6$

4. Father's age is 4 less than five times the age of his son and the product of their ages is 288. Find the father's age.

   (a) 40 years 　　　　　(b) 36 years

   (c) 26 years 　　　　　(d) 42 years

5. The sum of a rational number and its reciprocal is $\dfrac{13}{6}$, find the number.

   (a) $\dfrac{2}{3}$ or $\dfrac{3}{2}$ 　　　　　(b) $\dfrac{3}{4}$ or $\dfrac{4}{3}$

   (c) $\dfrac{2}{5}$ or $\dfrac{5}{2}$ 　　　　　(d) None of these

6. $\sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}} = ?$

   (a) 2.3 　　　　　(b) 3

   (c) 6 　　　　　(d) 6.3

7. If $x^2 + 2 = 2x$, then the value of $x^4 - x^3 + x^2 + 2$ is

   (a) 1 　　　　　(b) 0

   (c) -1 　　　　　(d) $\sqrt{2}$

8. Minimum value of $x^2 + \dfrac{1}{x^2 + 1} - 3$ is

   (a) 0 　　　　　(b) -1

   (c) -3 　　　　　(d) -2

9. One root of $x^2 + kx - 8 = 0$ is square of the other. Then the value of k is

   (a) 2 　　　　　(b) 8

   (c) -8 　　　　　(d) -2

10. If the roots x_1 and x_2 of the quadratic equation $x^2 - 2x + c = 0$ also satisfy the equation $7x_2 - 4x_1 = 47$, then which of the following is true?

    (a) $c = -15$ 　　　　　(b) $x_1 = -5, x_2 = 3$

    (c) $x_1 = 4.5, x_2 = -2.5$ 　　(d) None of these

11. For what value of k, are the roots of the quadratic equation $(k+1)x^2 - 2(k-1)x + 1 = 0$ real and equal?

    (a) $k = 0$ only 　　　　　(b) $k = -3$ only

    (c) $k = 0$ or $k = 3$ 　　　　(d) $k = 0$ or $k = -3$

12. If the roots of the equation
    $(a^2 + b^2)x^2 - 2ab(a+c)x + (b^2 + c^2) = 0$
    are equal, then which one of the following is correct?

    (a) $2b = a + c$ 　　　　　(b) $b^2 = ac$

    (c) $b + c = 2a$ 　　　　　(d) $b = ac$

13. If α and β are the roots of the equation $x^2 - 2x + 4 = 0$, then what is the value of $\alpha^3 + \beta^3$?

    (a) 16 　　　　　(b) -16

    (c) 8 　　　　　(d) -8

14. If p and q are the roots of the equation $x^2 - px + q = 0$, then what are the values of p and q respectively?

    (a) 1, 0 　　　　　(b) 0, 1

    (c) $-2, 0$ 　　　　　(d) $-2, 1$

15. What is the value of $\sqrt{5\sqrt{5\sqrt{5\sqrt{5 \dots \infty}}}}$?

    (a) 5 　　　　　(b) $\sqrt{5}$

    (c) 1 　　　　　(d) $(5)^{1/4}$

16. If r and s are roots of $x^2 + px + q = 0$, then what is the value of $\dfrac{1}{r^2} + \dfrac{1}{s^2}$?

    (a) $p^2 - 4q$ 　　　　　(b) $\dfrac{p^2 - 4q}{2}$

    (c) $\dfrac{p^2 - 4q}{q^2}$ 　　　　　(d) $\dfrac{p^2 - 2q}{q^2}$

17. Find the solution of $\dfrac{2x}{x-3} + \dfrac{1}{2x+3} + \dfrac{3x+9}{(x-3)(2x+3)} = 0$

    (a) 0 　　　　　(b) -1

    (c) 3 　　　　　(d) -3

18. If the roots of $x^2 - kx + 1 = 0$ are non-real, then

    (a) $-3 < k < 3$ 　　　　　(b) $-2 < k < 2$

    (c) $k > 2$ 　　　　　(d) $k < -2$

19. If $ax^2 + bx + c = 0$ has real and different roots, then

    (a) $b^2 - 4ac = 0$ 　　　　　(b) $b^2 - 4ac > 0$

    (c) $b^2 - 4ac < 0$ 　　　　　(d) $b^2 - 4ac \leq 0$

20. If $\sqrt{3x^2 + x + 5} = x - 3$, then the given equator has ...... solution/solutions.

(a) $x = -4$ (b) $x = \dfrac{1}{2}$

(c) $x = -4, \dfrac{1}{2}$ (both) (d) No solution

21. The sum of two numbers p and q is 18 and the sum of their reciprocals is $\dfrac{1}{4}$. Then the numbers are

(a) 10, 8 (b) 12, 6
(c) 9, 9 (d) 14, 4

22. If the roots of the equation $x^2 - bx + c = 0$ differ by 2, then which of the following is true?

(a) $c^2 = 4(c + 1)$ (b) $b^2 = 4c + 4$
(c) $c^2 = b + 4$ (d) $b^2 = 4(c + 2)$

23. The sum of a number and its reciprocal is one-fifth of 26. What is the sum of that number and its square?

(a) 3 (b) 4
(c) 5 (d) 6

24. Two numbers are such that the square of greater number is 504 less than 8 times the square of the other. If the numbers are in the ratio 3 : 4. Find the number.

(a) 15 and 20 (b) 6 and 8
(c) 12 and 16 (d) 9 and 12

25. The equation $x + \sqrt{x - 2} = 4$ has

(a) two real roots and one imaginary root
(b) one real and one imaginary root
(c) two imaginary roots
(d) one real root

26. The equation $\sqrt{x + 10} - \dfrac{6}{\sqrt{x + 10}} = 5$ has

(a) an extraneous root between –5 and –1
(b) an extraneous root between –10 and –6
(c) two extraneous roots
(d) a real root between 20 and 25
[An extraneous root means a root which does not satisfy the equation.]

27. If $\log_{10} (x^2 - 3x + 6) = 1$, then the value of x is

(a) 10 or 2 (b) 4 or –2
(c) 4 only (d) 4 or –1

28. The roots of the equation $2\sqrt{x} + 2x^{-\frac{1}{2}} = 5$ can be found by solving

(a) $4x^2 - 25x + 4 = 0$ (b) $4x^2 + 25x - 4 = 0$
(c) $4x^2 - 17x + 4 = 0$ (d) None of these

29. Two numbers whose sum is 6 and the absolute value of whose difference is 8 are the roots of the equation

(a) $x^2 - 6x + 7 = 0$ (b) $x^2 - 6x - 7 = 0$
(c) $x^2 + 6x - 8 = 0$ (d) $x^2 - 6x + 8 = 0$

30. The roots of the equation $x^2 + 2\sqrt{3}x + 3 = 0$ are

(a) real and equal (b) rational and equal
(c) rational and unequal (d) imaginary

31. The roots of the equation $ax^2 + bx + c = 0$ will be reciprocal if

(a) $a = b$ (b) $a = bc$
(c) $c = a$ (d) $b = c$

32. If $\dfrac{b}{x - a} = \dfrac{x + a}{b}$ then the value of x in terms of a and b is

(a) $\pm\sqrt{a^2 + b^2}$ (b) $+\sqrt{a^2 + b^2}$
(c) $-\sqrt{a^2 + b^2}$ (d) None of these

33. For what value of b and c would the equation $x^2 + bx + c = 0$ have roots equal to b and c.

(a) $(0, 0)$ (b) $(1, -2)$
(c) $(1, 2)$ (d) Both (a) and (b)

34. One of the factors of the expression

$4\sqrt{3}x^2 + 5x - 2\sqrt{3}$ is: [SSC-Sub. Ins.-2013]

(a) $4x + \sqrt{3}$ (b) $4x + 3$
(c) $4x - 3$ (d) $4x - \sqrt{3}$

35. If $x + \dfrac{1}{x} = 3$, then the value of $\dfrac{3x^2 - 4x + 3}{x^2 - x + 1}$ is

[SSC 10+2-2014]

(a) $\dfrac{4}{3}$ (b) $\dfrac{3}{2}$

(c) $\dfrac{5}{2}$ (d) $\dfrac{5}{3}$

36. If $x = p + \dfrac{1}{p}$ and $y = p - \dfrac{1}{p}$, then value of $x^4 - 2x^2 y^2 + y^4$ is

[SSC 10+2-2014]

(a) 24 (b) 4
(c) 16 (d) 8

37. If $x = 3 + 2\sqrt{2}$, then $\dfrac{x^6 + x^4 + x^2 + 1}{x^3}$ is equal to

[SSC 10+2-2014]

(a) 216 (b) 192
(c) 198 (d) 204

38. A certain number of capsules were purchased for ₹ 216. 15 more capsules could have been purchased in the same amount if each capsule was cheaper by ₹ 10. What was the number of capsules purchased? [IBPS Clerk-2013]

(a) 6 (b) 14
(c) 8 (d) 12
(e) 9

Level - II

1. The discriminant of $ax^2 - 2\sqrt{2}x + c = 0$ with a, c are real constants is zero. The roots must be
   (a) equal and integral
   (b) rational and equal
   (c) real and equal
   (d) imaginary

2. If one root of the equation $ax^2 + bx + c = 0$ is three times the other, then _____
   (a) $b^2 = 16\,ac$
   (b) $b^2 = ac$
   (c) $3b^2 = 16\,ac$
   (d) None of these

3. If the product of roots of the equation
   $x^2 - 3(2a+4)x + a^2 + 18a + 81 = 0$ is unity, then a can take the values as
   (a) $3, -6$
   (b) $10, -8$
   (c) $-10, -8$
   (d) $-10, -6$

4. If the roots of the equation
   $(a^2 + b^2)x^2 - 2(ac + bd)x + (c^2 + d^2) = 0$ are equal, then which of the following is true?
   (a) $ab = cd$
   (b) $ad = bc$
   (c) $ad = \sqrt{bc}$
   (d) $ab = \sqrt{cd}$

5. For what values of c in the equation
   $2x^2 - (c^3 + 8c - 1)x + c^2 - 4c = 0$ the roots of the equation would be opposite to signs?
   (a) $c \in (0, 4)$
   (b) $c \in (-4, 0)$
   (c) $c \in (0, 3)$
   (d) $c \in (-4, 4)$

6. If $x^2 - 3x + 2$ is a factor of $x^4 - ax^2 + b = 0$, then the values of a and b are
   (a) $-5, -4$
   (b) $5, 4$
   (c) $-5, 4$
   (d) $5, -4$

7. If α and β are the roots of the quadratic equation
   $ax^2 + bx + c = 0$, then the value of $\dfrac{\alpha^2}{\beta} + \dfrac{\beta^2}{\alpha}$ is
   (a) $\dfrac{3bc - a^3}{b^2 c}$
   (b) $\dfrac{3abc - b^3}{a^2 c}$
   (c) $\dfrac{3abc - b^2}{a^3 c}$
   (d) $\dfrac{ab - b^2 c}{2b^2 c}$

8. If a, b are the two roots of a quadratic equation such that $a + b = 24$ and $a - b = 8$, then the quadratic equation having a and b as its roots is
   (a) $x^2 + 2x + 8 = 0$
   (b) $x^2 - 4x + 8 = 0$
   (c) $x^2 - 24x + 128 = 0$
   (d) $2x^2 + 8x + 9 = 0$

9. If $m + \dfrac{1}{m-2} = 4$ then, what is value of
   $(m-2)^2 + \dfrac{1}{(m-2)^2} = ?$
   (a) -2
   (b) 0
   (c) 2
   (d) 4

10. If $x^2 + y^2 + \dfrac{1}{x^2} + \dfrac{1}{y^2} = 4$, then the value of $x^2 + y^2$ is
    (a) 2
    (b) 4
    (c) 8
    (d) 16

11. Let x, y be two positive numbers such that $x + y = 1$. Then,
    the minimum value of $\left(x + \dfrac{1}{x}\right)^2 + \left(y + \dfrac{1}{y}\right)^2$ is
    (a) 12
    (b) 20
    (c) 12.5
    (d) 13.3

12. Solve the simultaneous equations
    $$\sqrt{\dfrac{x}{y}} + \sqrt{\dfrac{y}{x}} = \dfrac{5}{2}; x + y = 10$$
    (a) $8, 6$
    (b) $8, 2$
    (c) $4, 6$
    (d) $5, 5$

13. If roots of an equation $ax^2 + bx + c = 0$ are positive, then which one of the following is correct?
    (a) Signs of a and c should be like
    (b) Signs of b and c should be like
    (c) Signs of a and b should be like
    (d) None of the above

14. If the sum of the squares of the roots of
    $x^2 - (p-2)x - (p+1) = 0\ (p \in R)$ is 5, then what is the value of p?
    (a) 0
    (b) -1
    (c) 1
    (d) $\dfrac{3}{2}$

15. If α and β are the roots of the equation $x^2 + 6x + 1 = 0$, then what is $|\alpha - \beta|$ equal to?
    (a) 6
    (b) $3\sqrt{2}$
    (c) $4\sqrt{2}$
    (d) 12

16. If $\dfrac{1}{2 - \sqrt{-2}}$ is one of the roots of $ax^2 + bx + c = 0$, where a, b, c are real, then what are the values of a, b, c respectively?
    (a) $6, -4, 1$
    (b) $4, 6, -1$
    (c) $3, -2, 1$
    (d) $6, 4, 1$

17. If α and β are the roots of the equation $ax^2 + bx + c = 0$, then
    the equation whose roots are $\dfrac{1}{\alpha + \beta}, \dfrac{1}{\alpha} + \dfrac{1}{\beta}$ is equal to
    (a) $acx^2 + (a^2 + bc)x + bc = 0$
    (b) $bcx^2 + (b^2 + ac)x + ab = 0$
    (c) $abx^2 + (c^2 + ab)x + ca = 0$
    (d) None of these

18. Find the roots of the equation $a^3 x^2 + abcx + c^3 = 0$
    (a) $\alpha^2\beta, \beta^2\alpha$
    (b) α, β^2
    (c) $\alpha^2\beta, \beta\alpha$
    (d) $\alpha^3\beta, \beta^3\alpha$

19. A natural number when increased by 12, equals 160 times its reciprocal. Find the number.
    (a) 3
    (b) 5
    (c) 8
    (d) 16

20. Solve: $\dfrac{1}{a+b+x} = \dfrac{1}{a} + \dfrac{1}{b} + \dfrac{1}{x}$; $a \neq 0, x \neq 0$
    (a) a, b
    (b) $-a, b$
    (c) $0, a$
    (d) $-a, -b$

21. Which is not true?
    (a) Every quadratic polynomial can have at most two zeros.
    (b) Some quadratic polynomials do not have any zero. [*i.e.* real zero]
    (c) Some quadratic polynomials may have only one zero. [*i.e.* one real zero]
    (d) Every quadratic polynomial which has two zeros.

22. The expression $a^2 + ab + b^2$ is _____ for $a < 0, b < 0$
    (a) $\neq 0$
    (b) < 0
    (c) > 0
    (d) $= 0$

23. For what value of c the quadratic equation $x^2 - (c + 6)\,x + 2(2c - 1) = 0$ has sum of the roots as half of their product?
    (a) 5
    (b) -4
    (c) 7
    (d) 3

24. If α and β are the roots of the equation $ax^2 + bx + c = 0$, then the equation whose roots are $\alpha + \dfrac{1}{\beta}$ and $\beta + \dfrac{1}{\alpha}$ is
    (a) $abx^2 + b(c + a)x + (c + a)^2 = 0$
    (b) $(c + a)x^2 + b(c + a)\,x + ac = 0$
    (c) $cax^2 + b(c + a)x + (c + a)^2 = 0$
    (d) $cax^2 + b(c + a)x + c(c + a)^2 = 0$

25. If $x^2 + ax + b$ leaves the same remainder 5 when divided by $x - 1$ or $x + 1$, then the values of a and b are respectively
    (a) 0 and 4
    (b) 3 and 0
    (c) 0 and 5
    (d) 4 and 0

26. The condition that both the roots of quadratic equation $ax^2 + bx + c = 0$ are positive is
    (a) a and c have an opposite sign that of b
    (b) b and c have an opposite sign that of a
    (c) a and b have an opposite sign that of c
    (d) None of these

27. If the equation $x^2 - bx + 1 = 0$ does not possess real roots, then which one of the following is correct?
    (a) $-3 < b < 3$
    (b) $-2 < b < 2$
    (c) $b > 2$
    (d) $b < -2$

28. If the roots of the quadratic equation $3x^2 - 5x + p = 0$ are real and unequal, then which one of the following is correct?
    (a) $p = 25/12$
    (b) $p < 25/12$
    (c) $p > 25/12$
    (d) $p \leq 25/12$

29. If the roots of the equation $x^3 - ax^2 + bx - c = 0$ are three consecutive integers, then what is the smallest possible value of b?
    (a) $-\dfrac{1}{\sqrt{3}}$
    (b) -1
    (c) 0
    (d) 1

30. If α, β are the roots of the equation $2x^2 - 3x - 6 = 0$, find the equation whose roots are $\alpha^2 + 2$ and $\beta^2 + 2$.
    (a) $4x^2 + 49x + 118 = 0$
    (b) $4x^2 - 49x + 118 = 0$
    (c) $4x^2 - 49x - 118 = 0$
    (d) $4x^2 + 49x - 118 = 0$

31. Sum of the areas of two squares is 468 m^2. If the difference of their perimeters is 24 m, find the sides of the two squares.
    (a) 9 m, 6 m
    (b) 18 m, 12 m
    (c) 18 m, 6 m
    (d) 9 m, 12 m

32. The sum of the ages of Puneet and his father is 45 years and the product of their ages is 126. What is the age of Puneet ?
    [*SSC CGL-2013*]
    (a) 3 years
    (b) 5 years
    (c) 10 years
    (d) 45 years