



**Solution of quadratic equations and Nature of roots**

1. The roots of the equation  $x^2 - 2ax + a^2 = 0$  are
  - (a)  $a, 2a$
  - (b)  $a, a$
  - (c)  $a, 2a^2$
  - (d) None of these
2. The roots of the equation  $x^2 - 2ax + a^2 = 0$  are
  - (a)  $a, a$
  - (b)  $a, 2a$
  - (c)  $a, 2a^2$
  - (d) None of these
3. The roots of the equation  $x^2 - 2ax + a^2 = 0$  are
  - (a)  $a, a$
  - (b)  $a, 2a$
  - (c)  $a, 2a^2$
  - (d) None of these
4. The roots of the equation  $x^2 - 2ax + a^2 = 0$  are
  - (a)  $1, 4$
  - (b)  $1, 2$
  - (c)  $1, 8$
  - (d)  $1, 16$

[UPSEAT 2004]
5. If  $x^2 - 2ax + a^2 = 0$  then
  - (a) 3
  - (b) 2
  - (c) 1
  - (d) None of these

[MNR 1985]
6. The number of roots of the quadratic equation  $x^2 - 2ax + a^2 = 0$  is
  - (a) Infinite
  - (b) 1
  - (c) 2
  - (d) 0

[Pb. CET 1989, 94]
7. The roots of the equation  $x^2 - 2ax + a^2 = 0$  are
  - (a) 0
  - (b) 1
  - (c) 0, 1
  - (d) None
8. The number which exceeds its positive square root by 12 is
  - (a) 9
  - (b) 16
  - (c) 25
  - (d) None of these
9. The roots of the equation  $x^2 - 2ax + a^2 = 0$  are
  - (a) 1, 2
  - (b) 0, 2
  - (c) 0, 1
  - (d) 1, 3
10. If  $x^2 - 2ax + a^2 = 0$  then
  - (a) {125}
  - (b) {8}
  - (c) {125, 8}
  - (d) {125, 8}

[BIT Ranchi 1992]
11. If  $x^2 - 2ax + a^2 = 0$ , then
  - (a) {3, 4}
  - (b) {3, -3}
  - (c) {3, 4, -3, -4}
  - (d) {-3, -3}

[BIT Ranchi 1992]

12. The solution set of the equation  $x^2 - 2ax + a^2 = 0$  is
  - (a)  $\{-2, 4\}$
  - (b)  $\{4\}$
  - (c)  $\{0, -2, 4\}$
  - (d) None of these

[Pb. CET 2003]
13. Let one root of  $x^2 - 2ax + a^2 = 0$  where  $a$  are integers be  $2$ , then the other root is
  - (a)  $2$
  - (b)  $3$
  - (c)  $4$
  - (d) None of these

[MNR 1982]
14. The number of real solutions of the equation  $x^2 - 2ax + a^2 = 0$  are
  - (a) 1
  - (b) 2
  - (c) 3
  - (d) 4

[IIT 1982, 89; MP PET 1997; DCE 2002; AMU 2000; UPSEAT 1999; AIEEE 2003]
15. The number of real roots of the equation  $x^2 - 2ax + a^2 = 0$  are
  - (a) 1
  - (b) 2
  - (c) Infinite
  - (d) None

[IIT 1982; Pb. CET 2000]
16. The number of real solutions of the equation  $|x^2 - 2ax + a^2| + 4x + 3 = 2x + 5 = 0$  are
  - (a) 1
  - (b) 2
  - (c) 3
  - (d) 4

[IIT 1988]
17. The roots of the given equation  $x^2 - 2ax + a^2 = 0$  are
  - (a)  $1, 2$
  - (b)  $1, 4$
  - (c)  $1, 8$
  - (d)  $1, 16$

[RPET 1986; MP PET 1999; Pb. CET 2004]
18. If a root of the equation  $x^2 - 2ax + a^2 = 0$  is 4, while the roots of the equation  $x^2 - 2bx + b^2 = 0$  are same, then the value of  $b$  will be
  - (a) 4
  - (b) 4/49
  - (c) 49/4
  - (d) None of these

[RPET 1991; AIEEE 2004]
19. How many roots the equation  $x^2 - 2ax + a^2 = 0$  have
  - (a) One
  - (b) Two
  - (c) Infinite
  - (d) None

[IIT 1984; UPSEAT 1999; Pb. CET 2003]
20. The solution of the equation  $x^2 - 2ax + a^2 = 0$  will be
  - (a)  $2, -1$
  - (b)  $0, -1$
  - (c)  $1, -1$
  - (d) None of these

[MNR 1983]
21. If the product of the roots of the equation  $x^2 - 2ax + a^2 = 0$  is  $4$ , then the value of  $a$  will be
  - (a)  $-1$
  - (b)  $1$
  - (c)  $2$
  - (d)  $-2$



22. If  $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$ , then  $x$  is equal to  
 (a) 2 (b) 3 (c) 6 (d) 5
23. The value of  $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$  is  
 (a) 1 (b) 2 (c) 3 (d) None of these
24. The roots of the equation  $x^2 + 2x + 1 = 0$  are given by  
 (a)  $-1, -1$  (b)  $-1, 1$  (c)  $1, 1$  (d)  $1, -1$
25. Let  $\alpha$  and  $\beta$  be the roots of the equation  $x^2 + px + q = 0$ . The equation whose roots are  $\frac{1}{\alpha}$  and  $\frac{1}{\beta}$  is  
**[IIT Screening 1994]**  
 (a)  $x^2 + px + q = 0$  (b)  $x^2 - px + q = 0$   
 (c)  $x^2 + px - q = 0$  (d)  $x^2 - px - q = 0$
26. If  $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$ , then  $x =$   
 (a) 6 (b)  $-1$  (c) 6 or  $-1$  (d) None of these
27. If  $\alpha$  and  $\beta$  are distinct roots of the equation  $x^2 + px + q = 0$ , then  $\frac{1}{\alpha} + \frac{1}{\beta} =$   
 (a)  $\frac{1}{p}$  (b)  $\frac{1}{q}$  (c)  $-\frac{1}{p}$  (d)  $-\frac{1}{q}$
28. The number of roots of the equation  $x^2 + 2x + 1 = 0$  is  
**[MNR 1995]**  
 (a) 1 (b) 2 (c) 3 (d) 4
29. The number of solutions of  $x^2 + 2x + 1 = 0$  is  
 (a) 2 (b) 3 (c) 1 (d) None of these
30. If  $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$ , then  $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} =$   
**[EAMCET 1994]**  
 (a) 4 (b) 6 (c) 3 (d) 2
31. If  $\alpha$  and  $\beta$  are roots of  $x^2 + px + q = 0$  and  $\frac{1}{\alpha} + \frac{1}{\beta} = \frac{1}{z}$ , then  $\frac{1}{z} =$   
**[EAMCET 1994]**  
 (a) 2 (b)  $\frac{65}{8}$  (c)  $\frac{37}{6}$  (d) None of these
32. The value of  $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$  is  
**[Karnataka CET 2001]**  
 (a)  $-1$  (b) 1 (c) 2 (d) 3
33. The value of  $x$  in the given equation  $x^2 + 2x + 1 = 0$  is  
 (a)  $-1$  (b)  $1$  (c) 2 (d) 3
34. The equation  $x^2 + 2x + 1 = 0$  has **[Kurukshetra CEE 1998]**  
 (a) Only one real root (b) At least two real roots  
 (c) Exactly two real roots (d) Infinitely many real roots
35. The equation  $x^2 + 2x + 1 = 0$  has **[IIT 1997 Cancelled]**  
 (a) No solution (b) One solution  
 (c) Two solutions (d) More than two solutions
36. The equation  $x^2 + 2x + 1 = 0$  can be written as  
**[Kurukshetra CEE 1998; MP PET 1989]**  
 (a)  $x^2 + 2x + 1 = 0$  (b)  $x^2 - 2x + 1 = 0$   
 (c)  $x^2 + 2x - 1 = 0$  (d)  $x^2 - 2x - 1 = 0$
37. If  $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$ , then  $\frac{1}{z} =$   
**[Pb. CET 1999]**  
 (a)  $x$  is an irrational number (b)  $\frac{1}{x}$   
 (c)  $\frac{1}{y}$  (d) None of these
38. The real roots of the equation  $x^2 + 2x + 1 = 0$  are  
**[UPSEAT 1993, 99; Orissa JEE 2004]**  
 (a)  $-1, 4$  (b)  $1, 4$   
 (c)  $-4, 4$  (d) None of these
39. A real root of the equation  $x^2 + 2x + 1 = 0$  is  
**[AMU 1999]**  
 (a) 1 (b) 2 (c) 3 (d) 4
40. **[EAMCET 2000]**  
 (a)  $\{-1, 2\}$  (b)  $\{1, 2\}$   
 (c)  $\{-1, -2\}$  (d)  $\{1, -2\}$
41. The number of solutions of  $x^2 + 2x + 1 = 0$  is  
**[IIT Screening 2001]**  
 (a) 3 (b) 1 (c) 2 (d) 0
42. The roots of  $x^2 + 2x + 1 = 0$  are **[UPSEAT 2003]**  
 (a) 0, 4 (b)  $-1, 3$   
 (c) 4, 2 (d) 5, 1
43. The solution of equation  $x^2 + 2x + 1 = 0$  is  
**[MP PET 2004]**  
 (a)  $-1$  (b) 1 (c) 2 (d) 3



- (a) (b)  
(c) (d)
44. The number of solutions for the equation is  
[Karnataka CET 2004]  
(a) 4 (b) 3  
(c) 2 (d) 1
45. If the roots of the given equation be equal, then  
(a) (b)  
(c) (d)
46. If and where , then has at least  
[IIT 1985; Pb. CET 2003; AMU 2005]  
(a) Four real roots (b) Two real roots  
(c) Four imaginary roots (d) None of these
47. Both the roots of the given equation are always  
[MNR 1986; IIT 1980; Kurukshetra CEE 1998; RPET 2002]  
(a) Positive (b) Negative  
(c) Real (d) Imaginary
48. If the roots of the given equation be equal in magnitude but opposite in sign, then =  
(a) 1 (b) 2  
(c) 3 (d) 2/3
49. If the roots of the equation + be real and equal, then will be in  
(a) A.P. (b) G.P.  
(c) H.P. (d) None of these
50. If , then the roots of the equation are  
(a) Equal (b) Imaginary  
(c) Real (d) None of these
51. The roots of the given equation are  
(a) Rational (b) Irrational  
(c) Real (d) Imaginary
52. If the roots of the equations and be real, then  
(a) (b)  
(c) (d)
53. If the roots of the equation be real, then the roots of the equation will be  
(a) Rational (b) Irrational  
(c) Real (d) Imaginary
54. If one of the roots of the equation and is coincident, then the numerical value of is  
[IIT 1986; RPET 1992; EAMCET 2002]  
(a) 0 (b) -1  
(c) 2 (d) 5
55. The equation has [IIT 1989]  
(a) At least one real solution  
(b) Exactly three real solutions  
(c) Exactly one irrational solution  
(d) All the above
56. If then both the roots of the equation  
(a) Are real and negative (b) Have negative real parts  
(c) Are rational numbers (d) None of these
57. The value of for which has equal and real roots are [BIT Ranchi 1990]  
(a) -9 and -7 (b) 9 and 7  
(c) -9 and 7 (d) 9 and -7
58. The roots of the quadratic equation , are [IIT 1983]  
(a) Irrational (b) Rational  
(c) Imaginary (d) None of these
59. If are real and , then the roots of the equation are [IIT 1979; RPET 1983]  
(a) Complex (b) Real and distinct  
(c) Real and equal (d) None of these
60. If the roots of the equation are real, then [RPET 1987, 97; MP PET 1999]  
(a) (b)  
(c) (d)
61. The roots of the equation are [RPET 1986]  
(a) Real and unequal (b) Rational and equal  
(c) Irrational and equal (d) Irrational and unequal
62. If the roots of the given equation are real, then [IIT 1990; RPET 1995]  
(a) (b)  
(c) (d)
63. If has two rational factors, then the value of  $m$  will be [RPET 1990]  
(a) (b)  
(c) (d) 6, 2
64. If  $a$  and  $b$  are the odd integers, then the roots of the equation will be [Pb. CET 1988]

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- (a) Rational (b) Irrational  
(c) Non-real (d) Equal
65. Roots of  $ax^2 + bx + c = 0$  are real and distinct if  
(a)  $b^2 - 4ac > 0$  (b)  $b^2 - 4ac < 0$   
(c)  $b^2 - 4ac = 0$  (d)  $b^2 - 4ac < 0$
66. Roots of the equations  $ax^2 + bx + c = 0$  and  $dx^2 + ex + f = 0$  are  
(a) Reciprocal and of same sign  
(b) Reciprocal and of opposite sign  
(c) Equal in product  
(d) None of these
67. If  $ax^2 + bx + c = 0$ , then both the roots of the equation  $cx^2 + bx + a = 0$  are  
(a) Rational (b) Non-real  
(c) Irrational (d) Zero
68. If  $ax^2 + bx + c = 0$ , then roots of the equation  $cx^2 + bx + a = 0$  are  
(a) Rational (b) Non-real  
(c) Irrational (d) Equal
69. The expression  $\frac{b^2 - 4ac}{(a+b+c)^2}$  has the positive value if  
[Roorkee 1995]  
(a)  $a, b, c$  are in A.P. (b)  $a, b, c$  are in G.P.  
(c)  $a, b, c$  are in H.P. (d)  $a, b, c$  are in A.M.
70. If the roots of  $ax^2 + bx + c = 0$  are equal, then absolute value of  $p$  is  
[MP PET 1995]  
(a) 144 (b) 12  
(c) 12 (d) 144
71. The condition for the roots of the equation,  $ax^2 + bx + c = 0$  to be equal is  
[TS Rajendra 1982]  
(a)  $b^2 - 4ac = 0$  (b)  $b^2 - 4ac < 0$   
(c)  $b^2 - 4ac > 0$  (d) None of these
72. If  $ax^2 + bx + c = 0$ , then at least one of the equations  $ax^2 + bx + c = 0$  and  $ax^2 + bx + c = 0$  has  
(a) Real roots (b) Purely imaginary roots  
(c) Imaginary roots (d) None of these
73. The value of  $k$  for which the quadratic equation,  $ax^2 + bx + c = 0$  has real and equal roots are  
[BIT Ranchi 1993]  
(a)  $b^2 - 4ac = 0$  (b)  $b^2 - 4ac < 0$   
(c)  $b^2 - 4ac > 0$  (d) None of these
74. The expression  $\frac{b^2 - 4ac}{(a+b+c)^2}$  has always the same sign as  $c$  if  
(a)  $a, b, c$  are in A.P. (b)  $a, b, c$  are in G.P.  
(c)  $a, b, c$  are in H.P. (d)  $a, b, c$  are in A.M.
75. The value of  $m$  for which the equation  $ax^2 + bx + c = 0$  has roots equal in magnitude but opposite in sign is  
(a)  $b^2 - 4ac = 0$  (b) 0  
(c)  $b^2 - 4ac < 0$  (d)  $b^2 - 4ac > 0$
76. The roots of the equation  $ax^2 + bx + c = 0$  are equal, then  
[MP PET 1996]  
(a)  $b^2 - 4ac = 0$  (b)  $b^2 - 4ac < 0$   
(c)  $b^2 - 4ac > 0$  (d)  $b^2 - 4ac < 0$
77. For what values of  $k$  will the equation  $ax^2 + bx + c = 0$  have equal roots  
[MP PET 1997]  
(a)  $b^2 - 4ac = 0$  (b)  $b^2 - 4ac < 0$   
(c)  $b^2 - 4ac > 0$  (d)  $b^2 - 4ac < 0$
78. If the roots of equation  $ax^2 + bx + c = 0$  are real, then  
[MP PET 1999]  
(a)  $b^2 - 4ac > 0$  (b)  $b^2 - 4ac < 0$   
(c)  $b^2 - 4ac = 0$  (d)  $b^2 - 4ac < 0$
79. Let  $ax^2 + bx + c = 0$ . The number of equations of the form  $ax^2 + bx + c = 0$  having real roots is  
[IIT Screening 1994]  
(a) 15 (b) 9  
(c) 7 (d) 8
80. For what value of  $k$  will the equation  $ax^2 + bx + c = 0$  have equal roots  
[Karnataka CET 1998]  
(a) 5 (b) 9  
(c) Both (a) and (b) (d) 0
81. The value of  $k$  for which the equation  $ax^2 + bx + c = 0$  has both real, distinct and negative is  
[Orissa JEE 2002]  
(a) 0 (b) 2  
(c) 3 (d) -4
82. If  $ax^2 + bx + c = 0$  then the roots of the equation  $cx^2 + bx + a = 0$  are  
[DCE 2002]  
(a) Complex  
(b) Real and unequal  
(c) Real and equal  
(d) One real and one imaginary
83. If the equation  $ax^2 + bx + c = 0$  has equal roots, then  $l, m$  and  $n$  satisfy  
[DCE 2002]  
(a)  $l^2 + m^2 + n^2 = 0$  (b)  $l^2 + m^2 + n^2 = 1$   
(c)  $l^2 + m^2 + n^2 = 2$  (d)  $l^2 + m^2 + n^2 = 3$

84. The least integer  $k$  which makes the roots of the equation  
 $x^2 + kx + 1 = 0$  imaginary is **[Kerala (Engg.) 2002]**  
 (a) 4 (b) 5  
 (c) 6 (d) 7
85. The roots of  $x^2 + px + q = 0$  are equal, then the value of  $p$  is  
**[MP PET 2003]**  
 (a)  $2\sqrt{q}$  (b)  $2\sqrt{-q}$   
 (c)  $2\sqrt{q}$  (d)  $2\sqrt{-q}$
86.  $x^2 + kx + 1 = 0$  is a perfect square for how  
 many values of  $k$  **[Orissa JEE 2004]**  
 (a) 2 (b) 0  
 (c) 1 (d) 3
87. If  $a, b, c$  are in G.P., then roots of  
 $x^2 + ax + b = 0$  are always **[Orissa JEE 2005]**  
 (a) Real (b) Imaginary  
 (c) Greater than 1 (d) Equal
88. The values of ' $a$ ' and ' $b$ ' for which equation  
 $x^2 + ax + b = 0$  have four real roots **[DCE 2005]**  
 (a)  $-6, -4$  (b)  $-6, 5$   
 (c)  $-6, 4$  (d)  $6, -4$

**Relation between roots and coefficients**

1. If one root of  $x^2 + px + q = 0$  is reciprocal of the other, then  
 $\frac{p}{q} =$  **[MNR 1980, 1983]**  
 (a) 0 (b) 5  
 (c)  $1/6$  (d) 6
2. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 + px + q = 0$ ,  
 then  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} =$  **[MNR 1981; RPET 1990]**  
 (a)  $\frac{p^2}{q}$  (b)  $\frac{p}{q}$   
 (c)  $\frac{q}{p}$  (d)  $\frac{p}{q}$
3. If the product of the roots of the equation  
 $x^2 + px + q = 0$  be 2, then the sum of roots  
 is **[MNR 1981; RPET 1990]**  
 (a) 1 (b)  $-1$   
 (c) 2 (d)  $-2$
4. If the roots of the equation  $x^2 + px + q = 0$  be  $\alpha$  and  $\beta$ , then  
 the roots of the equation  $x^2 + px + q = 0$  are  
**[MNR 1988; RPET 2003]**  
 (a)  $\alpha^2, \beta^2$  (b)  $\alpha^2, \beta^2$   
 (c)  $\alpha^2, \beta^2$  (d) None of these

5. If  $\alpha, \beta$  are the roots of the equation  $x^2 + px + q = 0$  then the  
 equation whose roots are  $\frac{\alpha}{\beta}$  and  $\frac{\beta}{\alpha}$  is **[RPET 1991]**  
 (a)  $x^2 + px + q = 0$   
 (b)  $x^2 + px + \frac{q}{p} = 0$   
 (c)  $x^2 + px + \frac{q}{p^2} = 0$   
 (d) None of these
6. If a root of the equation  $x^2 + px + q = 0$  be reciprocal of a root  
 of the equation  $x^2 + rx + s = 0$ , then **[IIT 1968]**  
 (a)  $ps = qr$   
 (b)  $ps = -qr$   
 (c)  $ps = rq$   
 (d) None of these
7. If  $\alpha, \beta$  and  $\gamma$  be the roots of the equation  
 $x^3 + px^2 + qx + r = 0$ , then the equation whose roots  
 are  $\frac{\alpha}{\beta}, \frac{\beta}{\gamma}, \frac{\gamma}{\alpha}$  is **[IIT 1968]**  
 (a)  $x^3 + px^2 + qx + r = 0$   
 (b)  $x^3 + px^2 + qx + r = 0$   
 (c)  $x^3 + px^2 + qx + r = 0$   
 (d) None of these
8. If  $\alpha$  is a root of the equation  $x^2 + px + q = 0$ , where  $p$   
 and  $q$  are real, then  $\frac{\alpha}{\beta} =$  **[IIT 1981; MP PET 1997, 2004]**  
 (a)  $\frac{p}{q}$  (b)  $\frac{q}{p}$   
 (c)  $(4, 7)$  (d)  $(7, 4)$
9. If the sum of the roots of the equation  $x^2 + px + q = 0$  be  
 equal to their product, then **[IIT 1981; MP PET 1997, 2004]**  
 (a) 4 (b)  $\frac{p}{q}$   
 (c) 6 (d) None of these
10. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 + px + q = 0$  and  
 $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} =$ , then **[IIT 1981; MP PET 1997, 2004]**  
 (a)  $-8$  (b)  $-16$   
 (c) 16 (d) 8
11. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 + px + q = 0$ ,  
 then the equation whose roots are  $\frac{\alpha}{\beta}$  and  $\frac{\beta}{\alpha}$  is **[IIT 1981; MP PET 1997, 2004]**  
 (a)  $x^2 + px + q = 0$  (b)  $x^2 + px + \frac{q}{p} = 0$   
 (c)  $x^2 + px + \frac{q}{p^2} = 0$  (d)  $x^2 + px + \frac{q}{p} = 0$
12. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 + px + q = 0$   
 then  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} =$  **[IIT 1981; MP PET 1997, 2004]**  
 (a)  $\frac{p}{q}$  (b)  $-\frac{p}{q}$   
 (c)  $\frac{q}{p}$  (d)  $-\frac{q}{p}$



13. If  $\alpha, \beta$  be the roots of the equation  $ax^2 + bx + c = 0$ , then  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} =$
- (a) 0 (b) 1  
(c)  $m$  (d)
14. If the ratio of the roots of the equation  $ax^2 + bx + c = 0$  be  $\frac{1}{2}$ , then  $\frac{a}{c} =$  [Ph. CET 1994]
- (a)  $\frac{1}{4}$  (b)  $\frac{1}{2}$   
(c)  $\frac{3}{4}$  (d) None of these
15. If  $\alpha, \beta$  are the roots of the equation  $ax^2 + bx + c = 0$ , then  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} =$
- (a)  $\frac{b^2 - 4ac}{4ac}$  (b)  $\frac{b^2 + 4ac}{4ac}$   
(c)  $\frac{b^2 - 4ac}{4ac}$  (d)
16. If the sum of the roots of the equation  $ax^2 + bx + c = 0$  be equal to the sum of their squares, then
- (a)  $\frac{b^2}{4ac}$  (b)  $\frac{b^2}{4ac} - 1$   
(c)  $\frac{b^2}{4ac} + 1$  (d)
17. If the roots of the equation  $ax^2 + bx + c = 0$  be equal in magnitude but opposite in sign, then  $\frac{a}{c} =$
- (a) 0 (b) 1  
(c) 2 (d) None of these
18. If  $\alpha, \beta$  be the roots of the equation  $ax^2 + bx + c = 0$ , then the equation whose roots are  $\frac{\alpha}{\beta}$  and  $\frac{\beta}{\alpha}$  is
- (a)  $ax^2 + bx + c = 0$  (b)  $ax^2 - bx + c = 0$   
(c)  $ax^2 + bx - c = 0$  (d)
19. If  $\alpha, \beta$  are the roots of  $ax^2 + bx + c = 0$  and  $\gamma, \delta$  are the roots of  $ax^2 + dx + e = 0$ , then  $\frac{\alpha}{\gamma} + \frac{\beta}{\delta} =$  [IIT 1978; DCE2000]
- (a)  $\frac{b}{d}$  (b)  $\frac{d}{b}$   
(c)  $\frac{c}{e}$  (d) None of these
20. If  $\alpha, \beta$  be the roots of  $ax^2 + bx + c = 0$  and  $\gamma, \delta$  be the roots of  $ax^2 + dx + e = 0$ , then the value of  $\frac{\alpha}{\gamma} + \frac{\beta}{\delta}$  is
- (a)  $\frac{b}{d}$  (b)  $\frac{d}{b}$   
(c)  $\frac{c}{e}$  (d)  $\frac{e}{c}$
- (c)  $\frac{b}{d}$   
(d)
21. If one root of  $ax^2 + bx + c = 0$  be square of the other, then the value of  $\frac{b^2}{4ac}$  is
- (a)  $\frac{1}{4}$  (b)  $\frac{1}{2}$   
(c) 0 (d) None of these
22. The quadratic in  $x$ , such that A.M. of its roots is  $\frac{1}{2}$  and G.M. is  $\frac{1}{4}$ , is [IIT 1968, 1974]
- (a)  $x^2 - x + \frac{1}{4} = 0$  (b)  $x^2 + x + \frac{1}{4} = 0$   
(c)  $x^2 - x - \frac{1}{4} = 0$  (d) None of these
23. If  $\alpha, \beta$  are the roots of  $ax^2 + bx + c = 0$  then the roots of  $cx^2 + bx + a = 0$  shall be [IIT 1992; MP PET 2000; DCE2000]
- (a)  $\alpha, c$  (b)  $\frac{c}{\alpha}, \frac{c}{\beta}$   
(c)  $\frac{c}{\alpha}, \frac{c}{\beta}$  (d)
24. If the difference of the roots of  $ax^2 + bx + c = 0$  be 2, then the value of  $p$  is [Roorkee 1992]
- (a)  $\frac{b^2}{4ac}$  (b)  $\frac{b^2}{4ac} - 1$   
(c)  $\frac{b^2}{4ac} + 1$  (d)
25. If the sum of the roots of the quadratic equation  $ax^2 + bx + c = 0$  is equal to the sum of the squares of their reciprocals, then  $\frac{a}{c}$  are in [AIEEE 2003; DCE 2000]
- (a) A.P. (b) G.P.  
(c) H.P. (d) None of these
26. If  $\alpha, \beta$  and  $\gamma$  are roots of  $ax^3 + bx^2 + cx + d = 0$ , then  $\frac{\alpha}{\beta} + \frac{\beta}{\gamma} + \frac{\gamma}{\alpha}$  is equal to [BIT Ranchi 1990]
- (a)  $\frac{b}{c}$  (b)  $\frac{c}{b}$   
(c)  $\frac{d}{c}$  (d)
27. The quadratic equation with real coefficients whose one root is  $\alpha + i\beta$ , will be [RPET 1992]
- (a)  $ax^2 + bx + c = 0$  (b)  $ax^2 - bx + c = 0$   
(c)  $ax^2 + bx - c = 0$  (d)
28. If the roots of the equation  $ax^2 + bx + c = 0$  are equal in magnitude but opposite in sign, then the product of the roots will be [IIT 1967; RPET 1999]
- (a)  $\frac{c}{a}$  (b)  $-\frac{c}{a}$   
(c)  $\frac{b}{a}$  (d)  $-\frac{b}{a}$



29. If the roots of the equation  $x^2 + px + q = 0$  are reciprocal to each other, then **[RPET 1985]**  
 (a)  $p = q$  (b)  $p = -q$   
 (c)  $p = 2q$  (d)  $p = -2q$
30. The quadratic equation whose one root is  $\frac{1}{2}$  will be **[RPET 1985]**  
 (a)  $x^2 + 2x + 1 = 0$  (b)  $x^2 + x + 2 = 0$   
 (c)  $x^2 + x + 1 = 0$  (d)  $x^2 + 2x + 2 = 0$
31. If the roots of the equation  $x^2 + px + q = 0$  are  $\alpha$  and the roots of the equation  $x^2 + qx + p = 0$  are  $\beta$ , then value of  $p$  will be **[RPET 1986]**  
 (a)  $\alpha + \beta$  (b)  $\alpha - \beta$   
 (c)  $\alpha\beta$  (d) None of these
32. The quadratic equation whose one root is  $\frac{1}{2}$  will be **[RPET 1987]**  
 (a)  $x^2 + 2x + 1 = 0$  (b)  $x^2 + x + 2 = 0$   
 (c)  $x^2 + x + 1 = 0$  (d)  $x^2 + 2x + 2 = 0$
33. If the roots of the equation  $x^2 + px + q = 0$  are  $\alpha$  and the roots of the equation  $x^2 + qx + p = 0$  are  $\beta$ , then  $\alpha + \beta$  is equal to **[RPET 1987]**  
 (a)  $-\frac{p}{q}$  (b)  $-\frac{q}{p}$   
 (c)  $\frac{p}{q}$  (d)  $\frac{q}{p}$
34. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 + px + q = 0$  then the value of  $\alpha + \beta$  is equal to **[RPET 1989; Ph. CET 1991]**  
 (a)  $-\frac{p}{q}$  (b)  $-\frac{q}{p}$   
 (c)  $\frac{p}{q}$  (d)  $\frac{q}{p}$
35. If the sum of the roots of the equation  $x^2 + px + q = 0$  is three times their difference, then which one of the following is true **[Dhanbad Engg. 1968]**  
 (a)  $p = 3q$  (b)  $p = -3q$   
 (c)  $p = 2q$  (d)  $p = -2q$
36. If the roots of the equation  $x^2 + px + q = 0$  are same, then the value of  $m$  will be **[MP PET 1986]**  
 (a) 3 (b) 0  
 (c) 2 (d) -1
37. If the roots of the given equation  $x^2 + px + q = 0$  are reciprocal to each other, then the value of  $k$  will be **[MP PET 1986]**  
 (a) 0 (b) 1  
 (c) 2 (d) 3
38. If the roots of the equation  $x^2 + px + q = 0$  are  $\alpha$  and  $\beta$ , then **[MP PET 1986; MP PET 2002]**  
 (a)  $\alpha + \beta = -p$  (b)  $\alpha\beta = q$   
 (c)  $\alpha - \beta = \frac{p}{q}$  (d)  $\alpha + \beta = \frac{p}{q}$
39. The sum of the roots of a equation is 2 and sum of their cubes is 98, then the equation is **[MP PET 1986]**  
 (a)  $x^2 + 2x + 1 = 0$  (b)  $x^2 + x + 2 = 0$   
 (c)  $x^2 + x + 1 = 0$  (d)  $x^2 + 2x + 2 = 0$
40. If the roots of the equation  $x^2 + px + q = 0$  are  $\alpha$  and  $\beta$ , then the value of  $\alpha^2 + \beta^2$  will be **[EAMCET 1980; AMU 1984]**  
 (a)  $p^2 - 2q$  (b) 0  
 (c)  $p^2 + 2q$  (d) None of these
41. If the product of roots of the equation,  $x^2 + px + q = 0$  is  $-1$ , then the value of  $m$  will be **[Ph. CET 1990]**  
 (a) 1 (b)  $-1$   
 (c)  $\frac{1}{2}$  (d)  $-\frac{1}{2}$
42. The roots of the equation  $x^2 + px + q = 0$  are  $p$ , and  $q$ , then the equation whose roots are  $\frac{1}{p}$  and  $\frac{1}{q}$  will be **[MP PET 1980]**  
 (a)  $x^2 + px + q = 0$  (b)  $x^2 + qx + p = 0$   
 (c)  $x^2 + px + p = 0$  (d)  $x^2 + qx + q = 0$
43. The equation whose roots are  $\frac{1}{\alpha}$  and  $\frac{1}{\beta}$  is **[MP PET 1994]**  
 (a)  $x^2 + px + q = 0$  (b)  $x^2 + qx + p = 0$   
 (c)  $x^2 + px + p = 0$  (d)  $x^2 + qx + q = 0$
44. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 + px + q = 0$  the value of  $\alpha^2 + \beta^2$  is **[MP PET 1994]**  
 (a) 76 (b) 52  
 (c)  $-52$  (d)  $-76$
45. A two digit number is four times the sum and three times the product of its digits. The number is **[MP PET 1994]**  
 (a) 42 (b) 24  
 (c) 12 (d) 21
46. If  $\alpha$  and  $\beta$  be the roots of the equation  $x^2 + px + q = 0$  then the value of  $\alpha^2 + \beta^2$  is equal to **[Bihar CEE 1994]**  
 (a) 1 (b) 64  
 (c) 8 (d) None of these
47. Let  $\alpha$  and  $\beta$  be the roots of  $x^2 + px + q = 0$ , then the equation whose roots are  $\frac{1}{\alpha}$  and  $\frac{1}{\beta}$  is **[AMU 1999]**  
 (a)  $x^2 + px + q = 0$  (b)  $x^2 + qx + p = 0$



- (c) (d)
48. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 + px + q = 0$ , where  $p, q \in \mathbb{R}$ , then  $pq$  is equal to
- (a)  $\frac{p^2}{4}$  (b)  $-\frac{p^2}{4}$   
 (c)  $\frac{q^2}{4}$  (d)  $-\frac{q^2}{4}$
49. If  $\alpha, \beta$  are the roots of the quadratic equation  $x^2 + px + q = 0$ , then the equation whose roots are  $\frac{\alpha}{\beta}$  and  $\frac{\beta}{\alpha}$  is [Ph. CET 1989]
- (a)  $x^2 + px + q = 0$   
 (b)  $x^2 + qx + p = 0$   
 (c)  $x^2 + px - q = 0$   
 (d)  $x^2 + qx - p = 0$
50. If  $\alpha, \beta$  and  $\gamma$  are the roots of the equation  $x^3 + px^2 + qx + r = 0$  (being different), then  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} + \frac{\beta}{\gamma} + \frac{\gamma}{\beta} + \frac{\gamma}{\alpha} + \frac{\alpha}{\gamma} =$  [DCE 2000]
- (a) Zero (b) Positive  
 (c) Negative (d) None of these
51. If the roots of the equation  $x^2 + px + q = 0$  are real and of the form  $\alpha + \beta i$  and  $\alpha - \beta i$ , then the value of  $\frac{\alpha}{\beta}$  is [AMU 2000]
- (a)  $\frac{p}{q}$  (b)  $\frac{q}{p}$   
 (c)  $\frac{p^2}{q}$  (d) None of these
52. If the ratio of the roots of  $x^2 + px + q = 0$  is same as the ratio of the roots of  $x^2 + rx + s = 0$ , then  $\frac{p}{q} = \frac{r}{s}$  [Ph. CET 1991]
- (a)  $\frac{p}{q} = \frac{r}{s}$  (b)  $\frac{p}{q} = \frac{s}{r}$   
 (c)  $\frac{p}{q} = \frac{r^2}{s^2}$  (d) None of these
53. Roots of the equation  $x^2 + px + q = 0$  are
- (a) Both positive (b) Both negative  
 (c) Of opposite sign (d) None of these
54. If  $p$  and  $q$  are the roots of the equation  $x^2 + px + q = 0$ , then  $q =$
- (a)  $-1$  (b)  $1$   
 (c)  $2$  (d) None of these
55. If the roots of  $x^2 + px + q = 0$  are  $\alpha$  and  $\beta$  and the roots of  $x^2 + rx + s = 0$  are  $\frac{\alpha}{\beta}$  and  $\frac{\beta}{\alpha}$ , then  $\frac{p}{q} = \frac{r}{s}$  is equal to [RPET 1999]
- (a)  $0$  (b)  $1$   
 (c)  $\frac{p}{q}$  (d)  $\frac{r}{s}$
56. If  $p$  and  $q$  are the roots of  $x^2 + px + q = 0$ , then  $\frac{p}{q} =$  [IIT 1995; AIEEE 2002; UPSEAT 2003; RPET 2001]
- (a)  $\frac{p}{q}$  (b)  $\frac{q}{p}$   
 (c)  $\frac{p^2}{q}$  (d)  $\frac{q^2}{p}$
57. If one root of the quadratic equation,  $x^2 + px + q = 0$  is  $\alpha + i\beta$ , then the other root is
- (a)  $-\alpha - i\beta$  (b)  $i$   
 (c)  $\alpha - i\beta$  (d)  $\beta$
58. If the roots of equation  $x^2 + px + q = 0$  are reciprocal to each other, then value of  $\frac{p}{q}$  is [RPET 1995; MP PET 2002]
- (a)  $5$  (b)  $2$   
 (c)  $1/5$  (d)  $1$
59. If roots of  $x^2 + px + q = 0$  are  $\alpha$  and  $\beta$ , then  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} =$  [RPET 1995]
- (a)  $6/7$  (b)  $7/6$   
 (c)  $7/10$  (d)  $8/9$
60. If  $\alpha, \beta$  are the roots of  $x^2 + px + q = 0$ , then  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$  is equal to [EAMCET 1990]
- (a)  $16$  (b)  $32$   
 (c)  $64$  (d) None of these
61. If  $\alpha, \beta$  and  $\gamma$  are the roots of  $x^3 + px^2 + qx + r = 0$ , then  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} + \frac{\beta}{\gamma} + \frac{\gamma}{\beta} + \frac{\gamma}{\alpha} + \frac{\alpha}{\gamma} =$
- (a)  $\frac{p}{q}$  (b)  $\frac{q}{p}$   
 (c)  $\frac{p^2}{q}$  (d)  $\frac{q^2}{p}$
62. The roots of the quadratic equation  $x^2 + px + q = 0$  are  $\alpha + \beta i$  and  $\alpha - \beta i$ , then  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} =$
- (a)  $\frac{p}{q}$  and  $\frac{q}{p}$  (b)  $\frac{p}{q}$  and  $\frac{q^2}{p}$   
 (c)  $\frac{p}{q}$  and  $\frac{q^2}{p^2}$  (d) None of these
63. If  $\alpha, \beta$  are the roots of  $x^2 + px + q = 0$ , then the equation whose roots are  $\frac{\alpha}{\beta}$  and  $\frac{\beta}{\alpha}$  is [EAMCET 1994]
- (a)  $x^2 + px + q = 0$   
 (b)  $x^2 + qx + p = 0$   
 (c)  $x^2 + px - q = 0$   
 (d)  $x^2 + qx - p = 0$
64. If the ratio of the roots of  $x^2 + px + q = 0$  and  $x^2 + rx + s = 0$  be the same, then  $\frac{p}{q} = \frac{r}{s}$  [EAMCET 1994]
- (a)  $\frac{p}{q} = \frac{r}{s}$  (b)  $\frac{p}{q} = \frac{s}{r}$   
 (c)  $\frac{p}{q} = \frac{r^2}{s^2}$  (d)  $\frac{p}{q} = \frac{s^2}{r^2}$
65. If one root of  $x^2 + px + q = 0$  is square of the other, then  $k =$  [EAMCET 1986, 1987]
- (a)  $\frac{p}{q}$  (b)  $\frac{q}{p}$

- (c) (d)
66. If  $\alpha$  is a root of the equation  $x^2 + px + q = 0$  ( $p, q$  are real numbers), then [EAMCET 1985]  
 (a)  $-\alpha$  (b)  $\alpha$   
 (c)  $\alpha^2$  (d)  $-\alpha^2$
67. If the sum of the roots of the quadratic equation  $ax^2 + bx + c = 0$  is equal to the sum of the squares of their reciprocals, then [BIT Ranchi 1996]  
 (a) 2 (b) -2  
 (c) 1 (d) -1
68. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 + px + q = 0$  and satisfy the relation  $\alpha + \beta = \alpha\beta$  then the value of  $a$  is  
 (a) -8 (b) 8  
 (c) -16 (d) 9
69. If  $\alpha, \beta$  are the roots of the equation  $x^2 + px + q = 0$ , then the equation whose roots are  $\frac{1}{\alpha}, \frac{1}{\beta}$  and  $\frac{1}{\alpha\beta}$  is [MP PET 1997]  
 (a)  $x^2 + px + q = 0$   
 (b)  $x^2 + qx + p = 0$   
 (c)  $x^2 + px + \frac{q}{p} = 0$   
 (d)  $x^2 + qx + \frac{p}{q} = 0$
70. If the roots of equation  $x^2 + px + q = 0$  differ by 1, then [MP PET 1999]  
 (a)  $p^2 = 4q$  (b)  $p^2 = 4q + 4$   
 (c)  $p^2 = 4q - 4$  (d) None of these
71. The harmonic mean of the roots of the equation  $ax^2 + bx + c = 0$  is [IIT 1999; MP PET 2000]  
 (a) 2 (b) 4  
 (c) 6 (d) 8
72. If the roots of  $ax^2 + bx + c = 0$  are two consecutive integers, then  $\frac{b^2}{4ac}$  is [RPET 1991; Kurukshetra CEE 1998; AIEEE 2005]  
 (a) 1 (b) 2  
 (c) 3 (d) 4
73. If  $\alpha, \beta$  and  $\gamma$  are roots of the equation  $x^3 + px^2 + qx + r = 0$ , then value of  $\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\gamma}$  is [RPET 1996; DCE 2005]  
 (a)  $-\frac{p}{r}$  (b)  $-\frac{q}{r}$   
 (c)  $-\frac{p}{q}$  (d)  $-\frac{q}{p}$
74. If  $\alpha, \beta$  are the roots of the equation  $x^2 + px + q = 0$  then the value of  $\frac{1}{\alpha} + \frac{1}{\beta}$  is [RPET 1996]  
 (a)  $-\frac{p}{q}$  (b)  $-\frac{q}{p}$   
 (c)  $-\frac{p}{q} - \frac{q}{p}$  (d)  $-\frac{p}{q} + \frac{q}{p}$
75. The value of  $p$  for which one root of the equation  $x^2 + px + q = 0$  is the square of the other, are [Roorkee Qualifying 1998]  
 (a) 125 only (b) 125 and 216  
 (c) 125 and 215 (d) 216 only
76. What is the sum of the squares of roots of  $x^2 + px + q = 0$  [Karnataka CET 1998]  
 (a) 5 (b) 7  
 (c) 9 (d) 10
77. Sum of roots is  $\frac{1}{2}$  and sum of their reciprocals is  $\frac{1}{3}$ , then equation is [Karnataka CET 1998]  
 (a)  $x^2 + \frac{1}{2}x + \frac{1}{3} = 0$  (b)  $x^2 + \frac{1}{3}x + \frac{1}{2} = 0$   
 (c)  $x^2 + \frac{1}{6}x + \frac{1}{6} = 0$  (d)  $x^2 + \frac{1}{6}x + \frac{1}{12} = 0$
78. If the sum of the roots of the equation  $x^2 + px + q = 0$  is equal to the sum of their squares, then [Ph. CET 1999]  
 (a)  $p^2 = 4q$  (b)  $p^2 = 4q + 4$   
 (c)  $p^2 = 4q - 4$  (d) None of these
79. If  $\alpha, \beta$  are roots of  $x^2 + px + q = 0$  then the equation whose roots are  $\frac{1}{\alpha}, \frac{1}{\beta}$  is [RPET 1999]  
 (a)  $x^2 + px + q = 0$  (b)  $x^2 + qx + p = 0$   
 (c)  $x^2 + px + \frac{q}{p} = 0$  (d) None of these
80. The equation formed by decreasing each root of  $ax^2 + bx + c = 0$  by 1 is [EAMCET 2000]  
 (a)  $a = -b$  (b)  $b = -c$   
 (c)  $c = -a$  (d)  $b = a + c$
81. If  $\alpha, \beta$  are the roots of  $x^2 + px + q = 0$  then the equation with the roots  $\frac{1}{\alpha}, \frac{1}{\beta}$  is [EAMCET 2000]  
 (a)  $x^2 + px + q = 0$  (b)  $x^2 + qx + p = 0$   
 (c)  $x^2 + px + \frac{q}{p} = 0$  (d)  $x^2 + qx + \frac{p}{q} = 0$
82. If  $\alpha$  and  $\beta$  are the roots of  $x^2 + px + q = 0$  then the value of  $\frac{1}{\alpha} + \frac{1}{\beta}$  is [RPET 2000]  
 (a)  $-\frac{p}{q}$  (b)  $-\frac{q}{p}$   
 (c)  $-\frac{p}{q} - \frac{q}{p}$  (d) None of these



83. Given that  $\alpha$  and  $\beta$  are the roots of  $ax^2 + bx + c = 0$ , then the value of  $\frac{\alpha^2 + \beta^2}{\alpha\beta}$  is [RPET 2000]
- (a)  $\frac{b^2 - 4ac}{c^2}$  (b)  $\frac{b^2 + 4ac}{c^2}$   
 (c)  $\frac{b^2 - 4ac}{a^2}$  (d)  $\frac{b^2 + 4ac}{a^2}$
84. If the roots of the quadratic equation  $ax^2 + bx + c = 0$  are reciprocal to each other, then [MP PET 2001]
- (a)  $a = c$  (b)  $a = -c$   
 (c)  $b = 0$  (d)  $b = -2\sqrt{ac}$
85. If the roots of the equation  $ax^2 + bx + c = 0$  are  $\alpha$  and  $\beta$  and the roots of equation  $ax^2 + px + q = 0$  are  $\alpha^2$  and  $\beta^2$ , then [MP PET 2001]
- (a)  $p = 1, q = -56$  (b)  $p = -1, q = -56$   
 (c)  $p = 1, q = 56$  (d)  $p = -1, q = 56$
86. The value of  $k$  for which one of the roots of  $x^2 + kx + 1 = 0$  is double of one of the roots of  $x^2 + 2x + k = 0$  is [UPSEAT 2001]
- (a) 1 (b) -2  
 (c) 2 (d) None of these
87. Let  $\alpha, \beta$  be the roots of  $x^2 + px + q = 0$  and  $\gamma, \delta$  be the roots of  $x^2 + rx + s = 0$ . If  $\alpha, \beta, \gamma, \delta$  are in G.P., then integral values of  $p, r$  are respectively [IIT Screening 2001]
- (a) -2, -32 (b) -2, 3  
 (c) -6, 3 (d) -6, -32
88. If A.M. of the roots of a quadratic equation is  $\frac{8}{5}$  and A.M. of their reciprocals is  $\frac{8}{7}$ , then the equation is [AMU 2001]
- (a)  $x^2 - 8x + 1 = 0$  (b)  $x^2 + 8x + 1 = 0$   
 (c)  $x^2 - 8x - 1 = 0$  (d)  $x^2 + 8x - 1 = 0$
89. If  $\alpha$  is a root of the equation  $x^2 + px + q = 0$ , then [EAMCET 2002]
- (a) -2 (b) -1  
 (c) 1 (d) 2
90. If 3 is a root of  $x^2 + px + q = 0$  it is also a root of  $x^2 + rx + s = 0$  [EAMCET 2002]
- (a)  $r = 3, s = 3$  (b)  $r = 3, s = 9$   
 (c)  $r = 9, s = 3$  (d)  $r = 9, s = 9$
91. If  $\alpha, \beta$  but  $\alpha + \beta$  and  $\alpha\beta$ , then the equation whose roots are  $\alpha^2$  and  $\beta^2$  is [AIEEE 2002]
- (a)  $x^2 + (\alpha + \beta)x + \alpha\beta = 0$  (b)  $x^2 + (\alpha - \beta)x + \alpha\beta = 0$   
 (c)  $x^2 + (\alpha + \beta)x - \alpha\beta = 0$  (d)  $x^2 + (\alpha - \beta)x - \alpha\beta = 0$
92. Difference between the corresponding roots of  $ax^2 + bx + c = 0$  and  $ax^2 + bx + d = 0$  is same and  $\frac{c}{d} = k$ , then [AIEEE 2002]
- (a)  $\frac{b^2 - 4ac}{c^2} = \frac{b^2 - 4ad}{d^2}$  (b)  $\frac{b^2 + 4ac}{c^2} = \frac{b^2 + 4ad}{d^2}$   
 (c)  $\frac{b^2 - 4ac}{a^2} = \frac{b^2 - 4ad}{a^2}$  (d)  $\frac{b^2 + 4ac}{a^2} = \frac{b^2 + 4ad}{a^2}$
93. Product of real roots of the equation  $ax^2 + bx + c = 0$  [AIEEE 2002]
- (a) Is always positive (b) Is always negative  
 (c) Does not exist (d) None of these
94. If the roots of the equation  $ax^2 + bx + c = 0$  are in the ratio 2 : 3, then  $m = \frac{b^2 - 4ac}{c^2}$  [RPET 2002]
- (a)  $\frac{1}{5}$  (b)  $\frac{1}{10}$   
 (c)  $\frac{1}{15}$  (d) None of these
95. If one root of the equation  $ax^2 + bx + c = 0$  is  $\alpha$ , then values of  $p$  and  $q$  are [UPSEAT 2002]
- (a) -4, 1 (b) 4, -1  
 (c) 2, (d)
96. The condition that one root of the equation  $ax^2 + bx + c = 0$  is three times the other is [DCE 2002]
- (a)  $3b^2 = 8ac$  (b)  $3b^2 = 4ac$   
 (c)  $3b^2 = 2ac$  (d)
97. The equation whose roots are reciprocal of the roots of the equation  $ax^2 + bx + c = 0$  is [DCE 2002]
- (a)  $cx^2 + bx + a = 0$  (b)  $ax^2 + bx + c = 0$   
 (c)  $ax^2 + bx + a = 0$  (d) None of these
98. If  $\alpha, \beta$  are the roots of the equation  $ax^2 + bx + c = 0$  then  $\frac{\alpha^2 + \beta^2}{\alpha\beta}$  is equal to [Kerala (Engg.) 2002]
- (a)  $\frac{b^2 - 4ac}{c^2}$  (b)  $\frac{b^2 + 4ac}{c^2}$   
 (c) 32 (d)
99. The equation of the smallest degree with real coefficients having  $\alpha + \beta$  as one of the root is [Kerala (Engg.) 2002]
- (a)  $x^2 + (\alpha + \beta)x + \alpha\beta = 0$  (b)  $x^2 + (\alpha - \beta)x + \alpha\beta = 0$   
 (c)  $x^2 + (\alpha + \beta)x - \alpha\beta = 0$  (d)  $x^2 + (\alpha - \beta)x - \alpha\beta = 0$
100. Let two numbers have arithmetic mean 9 and geometric mean 4. Then these numbers are the roots of the quadratic equation [AIEEE 2004]
- (a)  $x^2 - 18x + 16 = 0$  (b)  $x^2 + 18x + 16 = 0$   
 (c)  $x^2 - 18x - 16 = 0$  (d)  $x^2 + 18x - 16 = 0$
101. If  $\alpha, \beta$  are the roots of the equation  $ax^2 + bx + c = 0$ . Then the value of  $\frac{\alpha^2 + \beta^2}{\alpha\beta}$  is [MP PET 2004]
- (a)  $\frac{b^2 - 4ac}{c^2}$  (b) 1  
 (c) 0 (d)



102. If  $a$  and  $b$  are roots of  $x^2 + px + q = 0$ , then  $\frac{a}{b} + \frac{b}{a}$  is equal to (c)  $\frac{p^2 - q}{q}$  or (d) None of these  
 [Orissa JEE 2004]
- (a)  $\frac{p}{q}$  (b)  $\frac{p^2 + q}{q}$   
 (c)  $\frac{p^2 - q}{q}$  (d)  $\frac{p^2 + q}{q}$
103. If one root of the equation  $x^2 + px + q = 0$  is the square of the other, then (a)  $p^2 = 4q$  (b)  $p^2 = -4q$   
 [IIT Screening 2004]  
 (c)  $p^2 = 3q$  (d)  $p^2 = -3q$
104. If one of the roots of equation  $x^2 + px + q = 0$  is 3 and one of the roots of the equation  $x^2 + rx + s = 0$  is three times the other root, then the value of  $b$  is equal to (a) 3 (b) 4  
 [J & K 2005]  
 (c) 2 (d) 1
105. If  $a, b, c$  are the roots of  $x^3 + px^2 + qx + r = 0$  and  $\frac{a}{b}, \frac{b}{c}, \frac{c}{a}$  are in G.P., where  $a, b, c \neq 0$ , then (a)  $p^2 = 3q$  (b)  $p^2 = -3q$   
 [IIT Screening 2005]  
 (c)  $p^2 = 4q$  (d)  $p^2 = -4q$
106. If  $a, b, c$  are the roots of  $x^3 + px^2 + qx + r = 0$ . If  $\frac{a}{b} + \frac{b}{c} + \frac{c}{a} = 1$ , then what is the value of  $p$  (a) 1 (b) 2  
 [Orissa JEE 2005]  
 (c) 3 (d) -2
107. If  $a, b, c$  are the roots of  $x^3 + px^2 + qx + r = 0$  and  $\frac{a}{b} + \frac{b}{c} + \frac{c}{a} = 1$  where  $a, b, c \neq 0$ , then the equation whose roots are  $\frac{a}{b}, \frac{b}{c}, \frac{c}{a}$  and  $1$  is (a)  $x^3 + px^2 + qx + r = 0$  (b)  $x^3 + px^2 + qx + r = 0$   
 [Kerala (Engg.) 2005]  
 (c)  $x^3 + px^2 + qx + r = 0$  (d)  $x^3 + px^2 + qx + r = 0$   
 (e)  $x^3 + px^2 + qx + r = 0$

**Condition for common roots, Quadratic expressions and Position of roots**

1. If both the roots of  $x^2 + px + q = 0$  and  $x^2 + rx + s = 0$  are common, then  $\frac{p}{r} + \frac{q}{s}$  is equal to (a) -1 (b) 0  
 [MNR 1983]  
 (c) 1 (d) 2
2. If a root of the equations  $x^2 + px + q = 0$  and  $x^2 + rx + s = 0$  is common, then its value will be (where  $a, b, c, d \neq 0$ ) (a)  $\frac{a}{b}$  (b)  $\frac{c}{d}$   
 [IIT 1974, 1976; RPET 1997]
3. If the two equations  $x^2 + px + q = 0$  and  $x^2 + rx + s = 0$  have one common root and the second has equal roots, then (a) 0 (b)  $\frac{p^2 - 4q}{4q}$   
 (c)  $\frac{p^2 - 4q}{4q}$  (d)  $\frac{p^2 - 4q}{4q}$
4. If  $x^2 + px + q = 0$  has a common root, then the value of  $\frac{p}{q}$  is equal to (a) 1 (b) 2  
 [EAMCET 1986]  
 (c) 3 (d) 4
5. If every pair of the equations  $x^2 + px + q = 0$ ,  $x^2 + rx + s = 0$ ,  $x^2 + tx + u = 0$  have a common root, then the sum of three common roots is (a)  $\frac{p+r+t}{3}$  (b)  $\frac{p+r+t}{3}$   
 (c)  $\frac{p+r+t}{3}$  (d)  $\frac{p+r+t}{3}$
6. If  $x^2 + px + q = 0$  and  $x^2 + rx + s = 0$  have a common root, then (a)  $p^2 = 4q$  (b)  $p^2 = -4q$   
 [IIT 1982; Kurukshetra CEE 1983]  
 (c)  $p^2 = 3q$  (d) None of these
7. If the equation  $x^2 + px + q = 0$  and  $x^2 + rx + s = 0$  have a common root, then (a) 0 (b) 1  
 [Orissa JEE 2002]  
 (c) 2 (d) -1
8. If  $x^2 + px + q = 0$  and  $x^2 + rx + s = 0$  have a common root, then  $\frac{p}{r} + \frac{q}{s}$  is equal to (a) 10 (b) 20  
 [Kerala (Engg.) 2002]  
 (c) 30 (d) 40
9.  $x^2 + px + q = 0$  and  $x^2 + rx + s = 0$  will have a common factor, if (a) 24 (b) 0, 24  
 [Roorkee 1981]  
 (c) 3, 24 (d) 0, 3
10. If  $x^2 + px + q = 0$  be a factor of  $x^2 + rx + s = 0$  then (a) (3, 4) (b) (4, 5)  
 [IIT 1974; MP PET 1995; Pb. CET 2001]  
 (c) (4, 3) (d) (5, 4)
11. If  $x$  be real, then the minimum value of  $x^2 + \frac{1}{x}$  is (a) -1 (b) 0  
 [MNR 1980]  
 (c) 1 (d) 2
12. If  $x$  is real, then the maximum and minimum values of expression  $x^2 + \frac{1}{x}$  will be (a) 4, -5 (b) 5, -4  
 [Dhanbad Engg. 1968]  
 (c) -4, 5 (d) -4, -5



13. If  $x$  is real, the expression  $\frac{x^2 + 2x + 1}{x^2 + 1}$  takes all value in the interval  $[\frac{1}{2}, \frac{3}{2}]$  [IIT 1969]
- (a)  $[\frac{1}{2}, \frac{3}{2}]$  (b)  $[\frac{1}{2}, \frac{3}{2}]$
- (c)  $[\frac{1}{2}, \frac{3}{2}]$  (d) None of these
14. If  $x^2 + 2x + 1$  is a factor of the expression  $x^3 + 2x^2 + 3x + 1$ , then [IIT 1980]
- (a)  $\frac{1}{2}$  (b)  $\frac{1}{2}$
- (c)  $\frac{1}{2}$  (d) None of these
15. If  $\alpha$  and  $\beta$  are real and distinct, then  $\frac{\alpha + \beta}{\alpha - \beta}$  is always [IIT 1979]
- (a) Non-negative (b) Non-positive
- (c) Zero (d) None of these