Quadratic Equations

Additional Problems For Self Practice (APSP)

PART - I : PRACTICE TEST PAPER

This Section is not meant for classroom discussion. It is being given to promote self-study and self testing amongst the Resonance students.

Max. Marks : 120 **Max. Time : 1 Hr.**

Important Instructions :

1. The test is of **1 hour** duration and max. marks 120.

2. The test consists **30** questions, **4 marks** each.

3. Only one choice is correct **1 mark** will be deducted for incorrect response. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.

4. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 3 above.

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1. The number of values of 'a' for which $a(a^2 – 3a + 2)x^2 + (a^3 – 5a^2 + 6a)\,x + a^2 – 2a = 0$ is an identity in x, is

(1) 0 (2) 1 (3) 2 (4) 3

2. The number of triplet (a,b,c) for which $a(2\cos^2x – 1) + b\sin^2x + c = 0$ is satisfied by all real (where $a,b, c \in N$)

(1) 0 (2) 1 (3) 2 (4) Infinite

3. If a and b are rational and b is not a perfect square, then the quadratic equation with rational coefficient whose one root is $\frac{1}{a+\sqrt{b}}$ is

(1) $x^2 – 2ax + (a^2 – b) = 0$ (2) $(a^2 – b)\,x^2 – 2ax + 1 = 0$

(3) $(a^2 – b^2)\,x^2 – 2bx + 1 = 0$ (4) $x^2 + (a^2 – b^2)x + (a^2 + b^2) = 0$

4. If $a, b \in R$ and $a \neq b$ then the roots of the quadratic equation $(a – b)\,x^2 – 5\,(a + b)\,x – 2\,(a –b) = 0$ are

(1) real and equal (2) real and unequal

(3) complex (4) rational and equal

5. The condition for which equation $\frac{1}{x} + \frac{1}{x+b} = \frac{1}{m} + \frac{1}{m+b}$ has real roots with equal in magnitude but opposite in sign, is

(1) $b^2 = m^2$ (2) $b^2 = 2m^2$ (3) $2b^2 = m^2$ (4) $4b^2 = m^2$

6. If ratio of the roots of the equation $ax^2 + bx + c = 0$ is p : q then

(1) $c(p + q)^2 = – pqb$ (2) $ac\,(p + q)^2 = b^2pq$

(3) $ac(p + q)^2 + b^2 pq = 0$ (4) $a(p + q)^2 + cpq = 0$

7. If roots of $a_1 x^2 + b_1x + c_1 = 0$ are α_1, β_1 and roots of $a_2x^2 + b_2x + c_2 = 0$ are α_2, β_2 such that $\alpha_1\alpha_2 = \beta_1\beta_2 = 1$ then

(1) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (2) $\frac{a_1}{c_2} = \frac{b_1}{b_2} = \frac{c_1}{a_2}$ (3) $a_1a_2 = b_1b_2 = c_1c_2$ (4) $\frac{a_1}{b_2} = \frac{b_1}{c_2} = \frac{c_1}{a_2}$

8. The number of real roots of the equation $(x^2 – 6x +1) (x^2 + 3x + 6) = 0$ is

(1) 0 (2) 2 (3) 4 (4) 1

9. $(2x^2 – 3x + 2) (2x^2 – 3x + 6) = 12$ then equation has

(1) four real roots (2) two real and two imaginary roots

(3) all imaginary roots (4) cannot say about roots

10. Let a, b, c be three distinct positive real number then the number of positive roots of $ax^2 + 2b + c = 0$ is

(1) 0 (2) 1 (3) 2 (4) 4

11. If $a > 1$, then roots of the equation $(1 – a) x^2 + 3ax – 1 = 0$ are

(1) one positive and one negative (2) both positive

(3) both negative (4) both roots are non real

12. Subset of the values of a for which the quadratic equation $3x^2 + 2(a^2 + 1) x + a^2 – 3a + 2 = 0$ possess roots of opposite sign is

(1) $(–\infty,1)$ (2) $(–\infty,0)$ (3) $(–1,3)$ (4) $\left(\frac{3}{2},2\right)$

13. If $x^2 – 4x + \log_{1/2}a = 0$ does not have two distinct real roots then maximum value of a is

(1) $\frac{1}{4}$ (2) $\frac{1}{16}$ (3) $-\frac{1}{4}$ (4) $-\frac{1}{16}$

14. If $c > 0$ and $4a + c < 2b$ then $ax^2 – bx + c = 0$ has a roots in the interval

(1) (0,2) (2) (2,4) (3) (0,1) (4) (–2,0)

15. If x is real, then the least value of the expression $\frac{x^2-6x+5}{x^2+2x+1}$ is

(1) – 1 (2) $-\frac{1}{2}$ (3) $-\frac{1}{3}$ (4) 4

16. Condition on a and b for which $x^2 – ax – b^2$, $(b\neq0)$ is less than zero for at least one positive x are

(1) $a – 3 > 0, b < 0$ (2) $a – 3 > 0, b > 0$

(3) $a \in R, b \in R – \{0\}$ (4) Cannot determine

17. If S be the set of real values of p for which the equation $x^2 = p(x + p)$ has its roots greater than p, then p is equal to

(1) $(–2, –1/2)$ (2) $\left(\frac{-1}{2},\frac{1}{4}\right)$ (3) φ (4) $(–\infty, 0)$

18. If α, β are roots of the equation $ax^2 + 2x + 5 = 0$ then the value of $(\alpha –1) (\beta –1) / [(\alpha +1) (\beta +1) + (4/a)]$ is

(1) $\frac{1}{a+2}$ (2) $a + 2$ (3) 1 (4) 2

19. If α, β are roots of the equation $3x^2 + 6x + c = 0$ then equation having roots $\alpha^2 + 2\alpha$, $\beta^2 + 2\beta$ is

(1) $3x^2 + 6cx + c^2 = 0$ (2) $9x^2 + 6cx + c^2 = 0$ (3) $3x^2 – 6cx + c^2 = 0$ (4) $9x^2 – 6cx + c^2 = 0$

20. If $(2x^2 + bx + c)(x^2 + bx - c) = 0$, b, c ∈ R then equation has
(1) four real roots (2) two real and two imaginary roots
(3) at least two real roots (4) four imaginary roots

21. If $f(x) = \frac{x^2-1}{x^2+1}$ ∀ x ∈ R then the minimum value of f
(1) does not exists because it is unbounded (2) is equal to 2
(3) is equal to 5 (4) is equal to –1

22. If $(\lambda^2 + \lambda - 2)x^2 + (\lambda + 2)x < 1$ ∀ x ∈ R then
(1) $\lambda \in (-2,1)$ (2) $\lambda \in (-2, 2/5)$ (3) $\lambda \in (2/5,1)$ (4) $\lambda \in [-2,2/5)$

23. If p, q ∈ {1,2,3,4} then the number of quadratic equations of the form $px^2 + qx + 1 = 0$ having real roots is :
(1) 15 (2) 9 (3) 7 (4) 8

24. If roots of the equation $x^2 - 2ax + a^2 + a - 3 = 0$ are real and less than 3, then
(1) $a < 2$ (2) $2 \le a \le 3$ (3) $3 < a \le 4$ (4) $a > 4$

25. The minimum value of the quadratic expression $4x^2 - 7x + 4$ ∀ x ∈ [1,5] is
(1) 1 (2) – 1 (3) 6 (4) $\frac{15}{16}$

26. If the roots of the equation $x^2 + ax + b = 0$ are c and d then
(1) $a + c + d = 0$ (2) $a - c - d = 0$ (3) $a + b + d = 0$ (4) $b - c - d = 0$

27. If $f(x) = px^2 + qx + r$, p,q, r ∈ R such that f(a) < 0 and f(b) < 0 where p > 0 and a < b then
(1) Both roots lies in $(-\infty,a)$ (2) Both roots lies in (b,∞)
(3) Both roots lies in (a,b) (4) One root lies in $(-\infty,a)$ and other in (b,∞)

28. If $5\alpha^2 - 3\alpha = -25$ and $5\beta^2 - 3\beta = -25$ then the value of $\alpha^2\beta + \alpha\beta^2$ is
(1) – 3 (2) 3 (3) 15 (4) – 15

29. If roots of the equation $5x^2 - 6x + 4 = 0$ are α, β then the equation having roots $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ is
(1) $4x^2 - 6x + 5 = 0$ (2) $4x^2 - 6x - 5 = 0$ (3) $5x^2 + 4x - 6 = 0$ (4) $5x^2 + 6x - 4 = 0$

30. If α, β, γ are roots of equation $x^3 - 3x + 1 = 0$, then $\alpha^2 + \beta^2 + \gamma^2$ is
(1) 0 (2) – 3 (3) 6 (4) 9

Practice Test (JEE-Main Pattern)

OBJECTIVE RESPONSE SHEET (ORS)

Quadratic Equations

Que.	1	2	3	4	5	6	7	8	9	10
Ans.										
Que.	11	12	13	14	15	16	17	18	19	20
Ans.										
Que.	21	22	23	24	25	26	27	28	29	30
Ans.										

PART - II : PRACTICE QUESTIONS

1. If $\alpha + \beta = -2$ and $\alpha^3 + \beta^3 = -56$, then the quadratic equation whose roots are α and β is

(1) $x^2 + 2x - 16 = 0$ (2) $x^2 + 2x + 15 = 0$

(3) $x^2 + 2x - 12 = 0$ (4) $x^2 + 2x - 8 = 0$

2. If $x = 2 + 2^{2/3} + 2^{1/3}$, then value of $x^3 - 6x^2 + 6x$ is

(1) 3 (2) 2 (3) 1 (4) 4

3. Which of the following is/are always false

(1) A quadratic equation with rational coefficients has zero or two irrational roots

(2) A quadratic equation with real coefficients has zero or two non-real roots

(3) A quadratic equation with irrational coefficients has zero or two rational roots

(4) A quadratic equation with integer coefficients has zero or two irrational roots

4. The number of values of k for which the equation $x^2 - 3x + k = 0$ has two distinct roots lying in the interval (0, 1) are

(1) Three (2) Two

(3) Infinitely many (4) No values of k satisfies the requirement

5. If the equation $x^2 + y^2 - 10x + 21 = 0$ has real roots $x = \alpha$ and $y = \beta$, then

(1) $3 \le x \le 7$ (2) $3 \le y \le 7$ (3) $-5 \le y \le 1$ (4) $-2 \le x \le 2$

6. If $2 + i$ and $\sqrt{5} - 2i$ are the roots of the equation $(x^2 + ax + b)(x^2 + cx + d) = 0$, where a, b, c, d are real constants, then product of all roots of the equation is

(1) 40 (2) $9\sqrt{5}$ (3) 45 (4) 35

7. If α and α^2 are the roots of the equation $x^2 - 6x + c = 0$, then the positive value of c is

(1) 2 (2) 8 (3) 4 (4) 9

8. If $a(p+q)^2 + 2apq + c = 0$ and $a(p+r)^2 + 2apr + c = 0$, then qr equals –

(1) $p^2 + \frac{c}{a}$ (2) $p^2 + \frac{a}{c}$ (3) $p^2 + \frac{a}{b}$ (4) $p^2 + \frac{b}{a}$

9. Roots of the equation $(a + b - c)x^2 - 2ax + (a - b + c) = 0$, $(a,b,c \in Q)$ are-

(1) rational (2) irrational (3) complex (4) can't be determine

10. If a,b,c,d are real numbers, then the number of real roots of the equation

$(x^2 + ax - 3b)(x^2 - cx + b)(x^2 - dx + 2b) = 0$ are

(1) 3 (2) 4 (3) 6 (4) At least 2

11. The number of real solutions of the equation $27^{1/x} + 12^{1/x} = 2(8^{1/x})$ is

(1) 0 (2) 1 (3) infinite (4) 2

12. If roots of the equation $x_2 - 10ax - 11b = 0$ are c and d and those of $x_2 - 10cx - 11d = 0$ are a and b then the value of a + b + c + d is (where a, b, c, d are all distinct numbers)

(1) 1210 (2) 110 (3) 1100 (4) 1200

13. If 'x' is real, then $\dfrac{x^2 - x + c}{x^2 + x + 2c}$ can take all real values if :

(1) $c \in [0, 6]$ (2) $c \in [-6, 0]$

(3) $c \in (-\infty, -6) \cup (0, \infty)$ (4) $c \in (-6, 0)$

14. If p, q, r, s ∈ R, then equaton $(x_2 + px + 3q)(-x_2 + rx + q)(-x_2 + sx - 2q) = 0$ has

(1) 6 real roots (2) at least two real roots

(3) 2 real and 4 imaginary roots (4) 4 real and 2 imaginary roots

15. If two roots of the equation $(a - 1)(x_2 + x + 1)_2 - (a + 1)(x_4 + x_2 + 1) = 0$ are real and distinct, then 'a' lies in the interval

(1) $(-2, 2)$ (2) $(-\infty, -2) \cup (2, \infty)$ (3) $(2, \infty)$ (4) $(-3,3)$

16. Number of solutions of equation $(a+x)_{2/3} + (x - a)_{2/3} = 4(a_2 - x_2)_{1/3}$ are :

(1) 3 (2) 4 (3) 1 (4) 2

17. The roots of the equation $(3-x)_4 + (2-x)_4 = (5-2x)_4$ are

(1) Two real and two imaginary (2) All imaginary

(3) All real (4) One real and three imaginary

APSP Answers

PART - I

1.	(3)	**2.**	(1)	**3.**	(2)	**4.**	(2)	**5.**	(2)	**6.**	(2)	**7.**	(2)
8.	(2)	**9.**	(2)	**10.**	(1)	**11.**	(2)	**12.**	(4)	**13.**	(2)	**14.**	(1)
15.	(3)	**16.**	(3)	**17.**	(3)	**18.**	(3)	**19.**	(2)	**20.**	(3)	**21.**	(4)
22.	(4)	**23.**	(3)	**24.**	(1)	**25.**	(1)	**26.**	(1)	**27.**	(4)	**28.**	(2)
29.	(1)	**30.**	(3)										

PART - II

1.	(4)	**2.**	(2)	**3.**	(3)	**4.**	(4)	**5.**	(1)	**6.**	(3)	**7.**	(2)
8.	(1)	**9.**	(1)	**10.**	(4)	**11.**	(1)	**12.**	(1)	**13.**	(4)	**14.**	(2)
15.	(2)	**16.**	(4)	**17.**	(1)								