SET 3

1. If α and β are roots of $y^2 + py + q = 0$ and also $y^{2n} + p^n y^n + q^n = 0$ and if $\dfrac{\alpha}{\beta}$ and $\dfrac{\beta}{\alpha}$ are the roots of the $y^n + 1 + (y+1)^n = 0$ then n must be
   (a) an integer
   (b) a natural number
   (c) an even integer
   (d) an odd integer.

2. Given a,b,c are real numbers. If α is a root of $a^2y^2 + by + c = 0$ and β is a root of $a^2y^2 - by - c = 0$ where $0 < \alpha < \beta$, then one root of $a^2y^2 + 2by + 2c = 0$ is γ such that
   (a) $\gamma < \alpha < \beta$
   (b) $\gamma < 0 < \alpha < \beta$
   (c) $\alpha < \beta < \gamma$
   (d) $\alpha < \gamma < \beta$

3. If α, β be the roots of $x^2 - px + q = 0$ and α', β' be the roots of $x^2 - p'x + q' = 0$ then the value of $(\alpha - \alpha')^2 + (\beta - \alpha')^2 + (\alpha - \beta')^2 + (\beta - \beta')^2$ is
   (a) $2\{p^2 - 2q + p'^2 - 2q' - pp'\}$
   (b) $2\{p^2 - 2q + p'^2 - 2q' + qq'\}$
   (c) $2\{p^2 - 2q - p'^2 - 2q' + pp'\}$
   (d) $2\{p^2 - 2q - p'^2 - 2q' - qq'\}$

4. If the roots of the equation $(a-1)(x^2+x+1)^2 = (a+1)(x^4+x^2+1)$ are real and distinct then the value of a $\in$
   (a) $(-\infty, 3]$
   (b) $(-\infty, -2) \cup (2, \infty)$

   -2,2
   (c) $[-3, \infty)$

5. If the roots of the equation $ax^2 - bx + c = 0$ are α, β then the roots of the equation $b^2cx^2 - ab^2x + a^3 = 0$ are
   (a) $\dfrac{1}{\alpha^3 + \alpha\beta}, \dfrac{1}{\beta^3 + \alpha\beta}$
   (b) $\dfrac{1}{\alpha^2 + \alpha\beta}, \dfrac{1}{\beta^2 + \alpha\beta}$
   (c) $\dfrac{1}{\alpha^4 + \alpha\beta}, \dfrac{1}{\beta^4 + \alpha\beta}$
   (d) none of these

6. If α, β are the roots of the equation $x^2 - ax + b = 0$ and $A_n = \alpha^n + \beta^n$, then which of the following is true?

(a) $A_{n+1} = aA_n + bA_{n-1}$
(b) $A_{n+1} = bA_n + aA_{n-1}$
(c) $A_{n+1} = aA_n - bA_{n-1}$
(d) $A_{n+1} = bA_n - aA_{n-1}$

7. Number of values of b for which equations $x^3 + bx + 1 = 0$ and $x^4 + bx^2 + 1 = 0$ have a common root

   (a) 0
   (b) 1
   (c) 2
   (d) infinite.

8. Total number of integral values of a so that $x^2 - (a+1)x + a - 1 = 0$ has integral roots is equal to

   (a) 1
   (b) 2
   (c) 4
   (d) none of these

9. If the equation $x^2 + ax + b = 0$ has distinct real roots and $x^2 + a|x| + b = 0$ has only one real root, then which of the following is true.

   (a) $b = 0, a > 0$
   (b) $b = 0, a < 0$
   (c) $b > 0, a < 0$
   (d) $b < 0, a > 0$

10. If the equation $|x^2 + bx + c| = k$ has four real roots then

    (a) $b^2 - 4c > 0$ and $0 < k < \dfrac{4c - b^2}{4}$
    (b) $b^2 - 4c < 0$ and $0 < k < \dfrac{4c - b^2}{4}$
    (c) $b^2 - 4c > 0$ and $0 < k > \dfrac{4c - b^2}{4}$
    (d) none of these

11. If a,b,c ,d $\in R$ then the equation $(x^2 + ax - 3b)(x^2 - cx + b)(x^2 - dx + 2b) = 0$ has

    (a) 6 real roots
    (b) 3 real roots
    (c) 4 real roots
    (d) at least 2 real roots.

12. Let α, β be the real and distinct roots of the equation $ax^2 + bx + c = |c|, (a > 0, c \neq 0)$ p, q be the real and distinct roots of the equation $ax^2 + bx + c = 0$. Then

(a) p and q lie between α, β

(b) p and q do not lie between α, β

(c) Only p lies between α and β

(d) Only q lies between α and β

13. Let f(x) $= ax^2 + bx + c$ and f(-1) $< 1, f(1) > -1, f(3) < -4$, and $a \neq 0$, then

    (a) $a > 0$

    (b) a< 0

    (c) sign of a can not be determined

    (d) $b > 0$

14. A point (α, α^2) lies inside the triangle formed by the coordinate axes and the line x+y=6. If α is a root of f(x) $=x^2 + ax + b = 0$ then which of the following is always true?

    (a) $f(0) > 0$

    (b) f(2)> 0

    (c) $f(\beta) \leq 0$ for atleast one $\beta \in (0, 2)$

    (d) $-4 < a < 0$