MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 42

Total Marks : 23

Max. Time : 22 min.

Topics : Fundamentals of Mathematics, Quadratic Equations

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1	**(3 marks, 3 min.)**	**[3, 3]**
Multiple choice objective (no negative marking) Q.2	**(5 marks, 4 min.)**	**[5, 4]**
Subjective Questions (no negative marking) Q.3,4,5,6,7	**(4 marks, 5 min.)**	**[15, 15]**

1. If roots of the quadratic equation $x^2 - x \ln (a^2 - 3a + 2) + a^2 - 4 = 0$ are of opposite sign, then

(A) $a \in (-2, 2)$ (B) $a \in (-\infty, 1) \cup (2, \infty)$

(C) $a \in (-\infty, -2) \cup (2, \infty)$ (D) $a \in (-2, 1)$

2. The complete solution set of the inequation $x - \frac{2(K-1)}{K} \le \frac{2}{3K}(x+1)$ is given by

(A) $(-\infty, 2]$ if $K > \frac{2}{3}$ (B) $[2, \infty)$ if $0 < K < \frac{2}{3}$ (C) $(-\infty, 2]$ if $K < 0$ (D) R if $K = \frac{2}{3}$

3. If α, β be the roots of the equation $\lambda^2(x^2 - x) + 2\lambda x + 3 = 0$ and λ_1, λ_2 be the two values of λ for which α and β are connected by the relation $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{4}{3}$ then find the equation whose roots are λ_1^2/λ_2 and λ_2^2/λ_1.

4. Solve $\frac{x^2 - |x| - 12}{x - 3} \ge 2x$

5. Solve $|x - 6| > |x^2 - 5x + 9|$

6. If α, β are the roots of the equation $x + 1 = \lambda x(1 - \lambda x)$ and λ_1, λ_2 be the two values of λ determined from the equation $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \pi - 2$, show that $\frac{\lambda_1^2}{\lambda_2^2} + \frac{\lambda_2^2}{\lambda_1^2} + 2 = 4\left(\frac{\pi+1}{\pi-1}\right)^2$.

7. If α, β are the roots of $x^2 + px + q = 0$ and also of $x^{2n} + p^n x^n + q^n = 0$ and if $\frac{\alpha}{\beta}, \frac{\beta}{\alpha}$ are the roots of $x^n + 1 + (x+1)^n = 0$, then prove that n must be an even integer.

Answers Key

1. (D) **2.** (A)(B)(C)(D)

3. $3x^2 + 68x - 18 = 0$, $\lambda^2 - 4\lambda - 6 = 0$, $(\lambda \neq 0)$

4. $x \in (-\infty, 3)$ **5.** $x \in (1, 3)$

6. $\left[\frac{(\lambda_1 + \lambda_2)^2 - 2\lambda_1\lambda_2}{\lambda_1\lambda_2}\right]^2$