

[STRAIGHT OBJECTIVE TYPE]**[4 × 3 = 12]**

- Q.1 Let $x = 2^{\log_3}$ and $y = 3^{\log_2}$ where base of the logarithm is 10, then which one of the following holds good?
 (A) $2x < y$ (B) $2y < x$ (C) $3x = 2y$ (D*) $y = x$
- Q.2 Which one of the following is the smallest?
 (A*) $\log_{10}\pi$ (B) $\sqrt{\log_{10}\pi^2}$ (C) $\left(\frac{1}{\log_{10}\pi}\right)^3$ (D) $\left(\frac{1}{\log_{10}\sqrt{\pi}}\right)$
- Q.3 If $x = \log_k b = \log_b c = \frac{1}{2} \log_c d$ then $\log_k d$ equals
 (A*) $2x^3$ (B) $\frac{x^3}{2}$ (C) $2x^8$ (D) $6x$
- Q.4 The number $N = 6 \log_{10} 2 + \log_{10} 31$, lies between two successive integers whose sum is equal to
 (A) 5 (B*) 7 (C) 9 (D) 10

[MULTIPLE OBJECTIVE TYPE]**[2 × 4 = 8]**

- Q.5 Select the correct statement.
 (A) $\log_3 19 \cdot \log_{1/7} 3 \cdot \log_4 \left(\frac{1}{7}\right) < 2$
 (B*) The equation $\log_{1/3}(x^2 + 8) = -2$ has two real solutions.
 (C) Let $N = \log_2 15 \cdot \log_{1/6} 2 \cdot \log_3 \left(\frac{1}{6}\right)$. The greatest integer which is less than or equal to N is 3.
 (D*) The equation $\log_4 x + \log_4(x + 2) = \log_4(3x)$ has no prime solution.
- Q.6 The equation $\frac{\log_8(8/x^2)}{(\log_8 x)^2} = 3$ has
 (A) no integral solution (B*) one natural solution
 (C*) two real solutions (D) one irrational solution

[MATCH THE COLUMN]**[3+3+3+3=12]**

- | Q.7 | Column-I | Column-II |
|-----|---|----------------|
| (A) | If x_1 and x_2 satisfy the equation $x^{\log_{10} x} = 100x$ then the value of $x_1 x_2$ equals | (P) irrational |
| (B) | Sum of the squares of the roots of the equation $\log_2(9 - 2^x) = 3 - x$ is | (Q) rational |
| (C) | If $\log_{1/8}(\log_{1/4}(\log_{1/2} x)) = \frac{1}{3}$ then x is | (R) prime |
| (D) | If $\log_b a = 3$, $\log_b c = -4$. If the value of x satisfying the equation $a^{3x} = c^{x-1}$ is expressed in the form p/q, where p and q are relatively prime then p + q is | (S) composite |

[Ans. (A) Q, S; (B) Q, S; (C) P; (D) Q, R]

[SUBJECTIVE]

- Q.8 A polynomial in x of degree three vanishes when $x = 1$ and $x = -2$, and has the values 4 and 28 when $x = -1$ and $x = 2$ respectively. Find the polynomial. **[4]**

[Ans. $(x - 1)(x + 2)(3x + 1)$]