SAMPLE PROBLEMS

(MATHEMATICS)

1. In ΔABC minimum value of cosec A/2 + cosec B/2 + cosec C/2 is

(a) 8 (b) $\frac{9}{2}$ (c) $\frac{9}{4}$ (d) None of these

2. If $f(x) = x^2 - 2x \quad x \in R$
and $g(x) = f(f(x) - 1) + f(5 - f(x))$, then $g(x)$ belongs to

(a) $(-4, \infty)$ (b) $[-4, \infty)$ (c) $(0, \infty)$ (d) $[0, \infty)$

3. If $f(x) = \begin{cases} x - [x] - \frac{1}{2} & \text{if} \quad x \notin I \\ 0 & \text{if} \quad x \in I \end{cases}$

where $[x]$ denotes the greatest Integer function then total no. of point of discontinuity of $g(x) = \max. \{x^2, f(x), |x|\}$, $-2 < x < 2$ will be

(a) 3 (b) 4 (c) 5 (d) 6

4. Let $f : R \to R$ and $g : R \to R$ be two one-one and onto function s.t. they are the mirror images of each other about the line $y = a$. If $h(x) = f(x) + g(x)$ then $h(x)$ is

(a) one-one and onto (b) only one-one and not onto
(c) only onto but not one-one (d) neither one-one nor onto

5. If $f(x) = \frac{t + 3x - x^2}{x - 4}$ where t is parameter that has a minimum & maximum, then the range of values of t is

(a) (0, 4) (b) $(0, \infty)$ (c) $(-\infty, 4)$ (d) $(4, \infty)$

6. If $\int \left[\left(\frac{x}{e}\right)^x + \left(\frac{e}{x}\right)^x \right] \log dx = A\left(\frac{x}{e}\right)^x + B\left(\frac{e}{x}\right)^x + C$ then value of A + B is

(a) 2 (b) 4 (c) 5 (d) none of these

7. If the function $f : [0, 8] \to R$ is differentiable, then for $0 < \alpha, \beta \le 2$, $\int_0^8 f(t)dt$ is equal to

(a) $3[\alpha^3 f(\alpha^2) + \beta^2 f(\beta^2)]$ (b) $3[\alpha^3 f(\alpha) + \beta^3 f(\beta)]$
(c) $3[\alpha^2 f(\alpha^3) + \beta^2 f(\beta^3)]$ (d) $3[\alpha^2 f(\alpha^2) + \beta^2 f(\beta^2)]$

8. If the equation $z^4 + a_1 z^3 + a_2 z^2 + a_3 z + a_4 = 0$ where a_1, a_2, a_3, a_4 are real coefficient different from zero, has a purely imaginary root then the expression $a_3 / (a_1 a_2) + (a_1 a_4) / (a_2 a_3)$ has the value equal to

(a) 0 (b) 1 (c) −2 (d) 2

9. If $1^2 + 2^2 + ...+ 2003^2 = (2003)(4007)(334)$ and $1.(2003) + 2(2002) + ... + (2003).1 = (2003)(334)(x)$ then x equals

(a) 2005 (b) 2004 (c) 2003 (d) 2001

10. If $(1 + 3 + 5 + ... + p) + (1 + 3 + ... + q) = (1 + 3 + 5 + ...+ r)$, where each set of parenthesis contains the sum of consecutive odd integers, then the smallest possible value of $p + q + r$, where $(p > 6)$ is

(a) 12 (b) 21 (c) 45 (d) 54

ANSWERS

(MATHEMATICS)

1. (d)	2. (d)	3. (b)	4. (d)	5. (c)
6. (d)	7. (c)	8. (b)	9. (a)	10. (b)