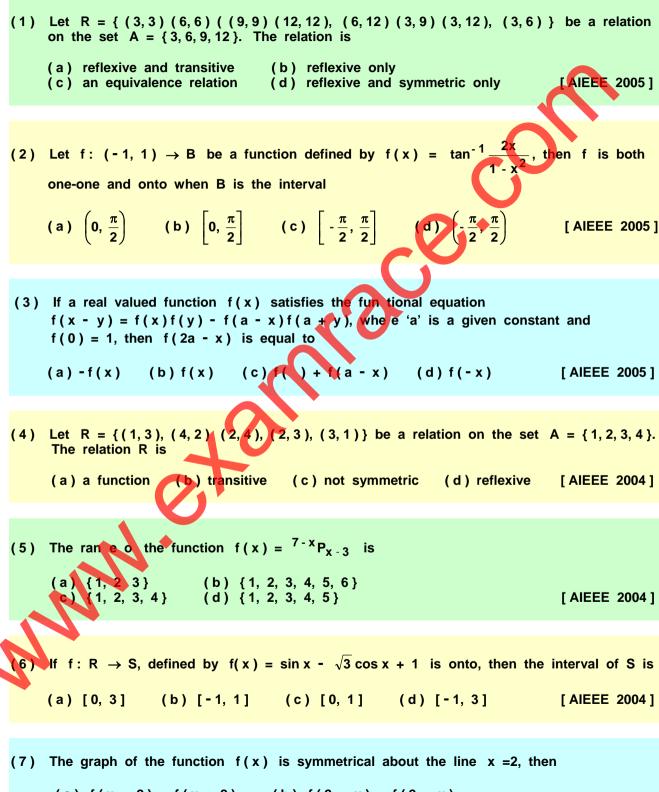
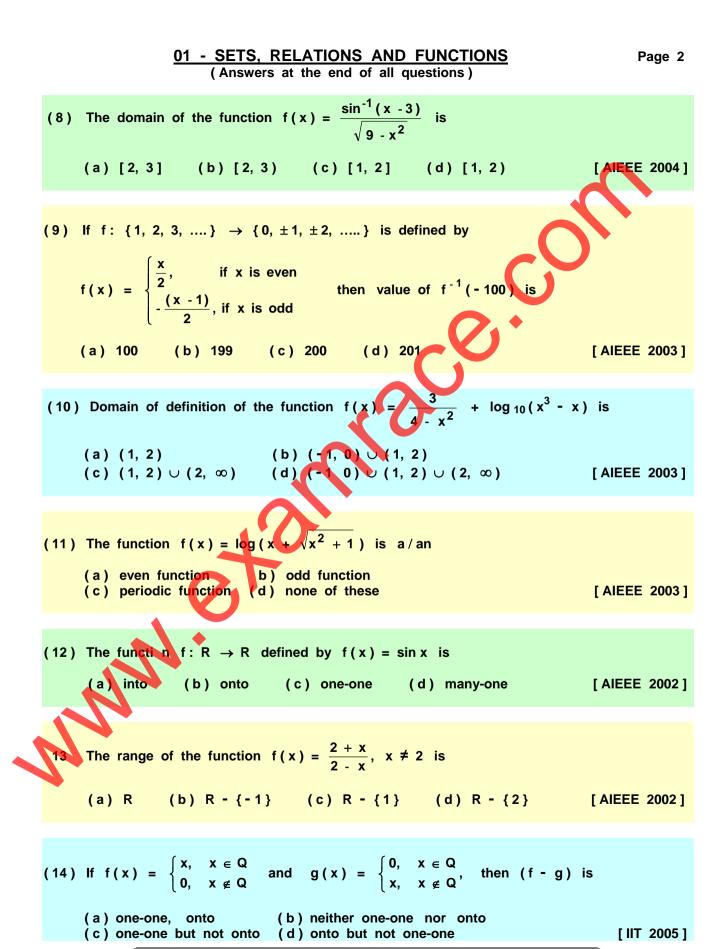
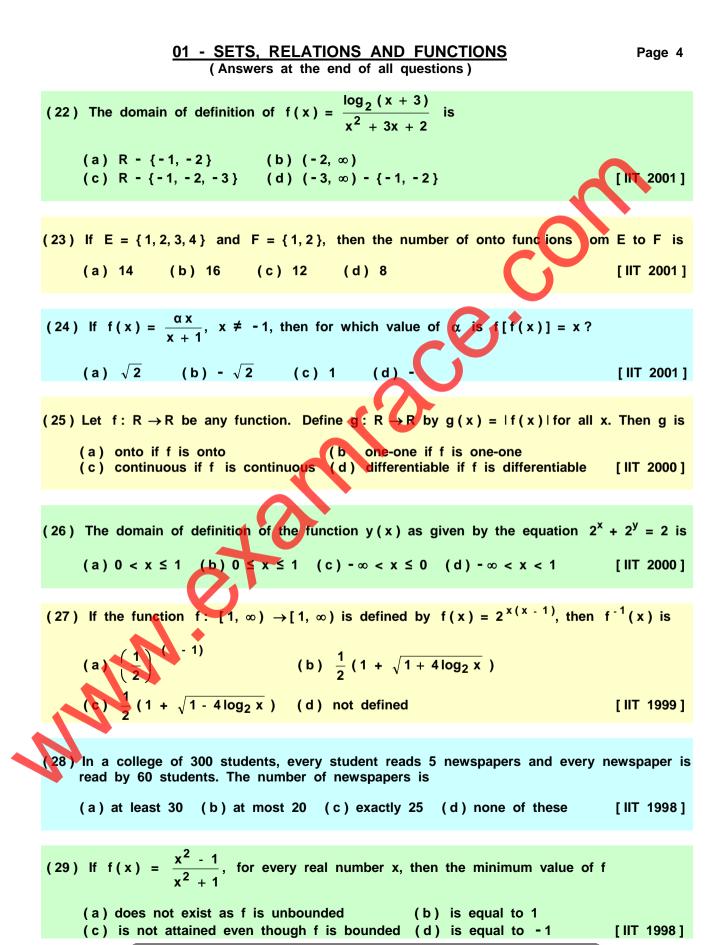
01 - SETS, RELATIONS AND FUNCTIONS (Answers at the end of all questions)



(a) f(x + 2) = f(x - 2) (b) f(2 + x) = f(2 - x)(c) f(x) = f(-x) (d) f(x) = -f(-x) [AIEEE 2004]



(15) If
$$f(x) = \sin x + \cos x$$
 and $g(x) = x^2 - 1$, then $g[f(x)]$ will be invertible for the domain
(a) $[0, \pi]$ (b) $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$ (c) $\left[0, \frac{\pi}{2}\right]$ (d) $\left[-\frac{\pi}{2}, 0\right[$ [IT 2004]
(16) The range of the function $f(x) = \frac{x^2 + x + 2}{x^2 + x + 1}$, $x \in (-\infty, \infty)$ is
(a) $[1, \infty)$ (b) $(1, \frac{11}{7})$ (c) $(1, \frac{7}{3}]$ (d) $[1, \frac{7}{5}]$ [IT 2003]
(17) $f:[0, \infty) \rightarrow [0, \infty)$, $f(x) = \frac{x}{1 + x}$ is
(a) one-one and onto (b) one-one bit no onto
(c) onto but not one-one (d) neither enclose nor onto [IT 2003]
(18) If $f(x) = (x + 1)^2$ for $x \ge -$ and $u(x)$ is the function whose graph is reflection
of the graph of $f(x)$ with respect to the line $y = x$, then $g(x)$ equals
(a) $-\sqrt{x} - 1$, $x \ge 0$ (b) $\frac{1}{(x + 1)^2}$, $x > -1$
(c) $\sqrt{x + 1}$, $x \ge -1$ (d) $\sqrt{x} - 1$, $x \ge 0$ [IT 2002]
(19) If function f: $\mathbb{R} \rightarrow \mathbb{B}$ is defined as $f(x) = 2x + \sin x$ for $x \in \mathbb{R}$, then f is
(a) one on and onto (b) one-one but not onto
(c) onto but not one-one (d) neither one-one nor onto [IT 2002]
(20) th $g(x) = 1 + x - [x]$ and $f(x) = \begin{cases} -1, x < 0 \\ 0, x = 0, \text{ then for all } x, f[g(x)] = 1, x > 0$
(a) x (b) 1 (c) $f(x)$ (d) $g(x)$ [IT 2001]
(21) If $f: [1, \infty) \rightarrow [2, \infty)$ is given by $f(x) = x + \frac{1}{x}$, then $f^{-1}(x)$ equals
(a) $\frac{x + \sqrt{x^2 - 4}}{2}$ (b) $\frac{x}{1 + x^2}$ (c) $\frac{x - \sqrt{x^2 - 4}}{2}$ (d) $1 + \sqrt{x^2 - 4}$ [IT 2001]



$$\frac{01 - SETS, RELATIONS AND FUNCTIONS}{(Answers at the end of all questions)} Page 5$$
(30) If $f(x) = 3x - 5$, then $f^{-1}(x)$
(a) is given by $\frac{1}{3x - 5}$ (b) is given by $\frac{x + 5}{3}$
(c) does not exist because f is not one-one
(d) does not exist because f is not onto
(31) If $g[f(x)] = 1 \sin x 1$ and $f[g(x)] = (\sin \sqrt{x})^2$, then
(a) $f(x) = \sin^2 x$, $g(x) = \sqrt{x}$ (b) $f(x) = \sin x - g(x) = 1x1$
(c) $f(x) = x^2$, $g(x) = \sqrt{x}$ (d) f and g cannot the determined [IIT 1998]
(32) If $f(x) = (x + 1)^2 - 1$, $(x \ge -1)$, then the iso $S = \{x : f(x) = f^{-1}(x)\}$ is
(a) $\left\{0, -1, \frac{-3 + i\sqrt{3}}{2}, \frac{-3 - i\sqrt{3}}{2}\right\}$ (b) $\{0, 1, -1\}$
(c) $\{0, -1\}$ (d) empty [IIT 1995]
(33) The number $\log_2 7$ is
(a) an integer
(c) an irrational number
(d) a prime number
(IIT 1990]
(34) If S is the set of all real x such that $\frac{2x - 1}{2x^3 + 3x^2 + x}$ is positive, then S contains
(d) $\left(-\infty, -\frac{3}{2}\right)$ (b) $\left(-\frac{3}{2}, -\frac{1}{4}\right)$ (c) $\left(-\frac{1}{4}, -\frac{1}{2}\right)$
(d) $\left(\frac{1}{2}, 3\right)$ (e) none of these [IIT 1986]

35) If
$$y = f(x) = \frac{x+2}{x-1}$$
, then
(a) $x = f(y)$ (b) $f(1) = 3$ (c) y increases with x for $x < 1$
(d) f is a rational function of x [IIT 1984]

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