

CH-10

Function

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I. C: MCQs WITH ONE CORRECT ANSWER

- 1) Suppose $f(x) = f(x+1)^2$ for $x \geq -1$. If $g(x)$ is the function whose graph is the reflection of the graph $f(x)$ with respect to the line $y = x$, then $g(x)$ equal (2002S)
 - a) $-\sqrt{x} - 1, x \geq 0$
 - b) $\frac{1}{(x+1)^2}, x > -1$
 - c) $\sqrt{x+1}, x \geq -1$
 - d) $\sqrt{x} - 1, x \geq 0$
- 2) Let function $f : R \rightarrow R$ be defined by $f(x) = 2x + \sin x$ for $x \in R$, then f is (2003S)
 - a) one-to-one and onto
 - b) one-to-one but not onto
 - c) onto but not one-to-one
 - d) neither one-to-one nor onto
- 3) If $f : [0, \infty) \rightarrow [0, \infty)$, and $f(x) = \frac{x}{1+x}$ then f is (2003S)
 - a) one-one and onto
 - b) one-one but not onto
 - c) onto but not one-one
 - d) neither one-one nor onto
- 4) Domain of definition of the functions $f(x) = \sqrt{\sin^{-1}(2x) + \frac{\pi}{6}}$ for real valued x , is (2003S)
 - a) $[-\frac{1}{4}, \frac{1}{2}]$
 - b) $[-\frac{1}{2}, \frac{1}{2}]$
 - c) $(-\frac{1}{2}, \frac{1}{9})$
 - d) $[-\frac{1}{4}, \frac{1}{4}]$
- 5) Range of the function $f(x) = \frac{x^2+x+2}{x^2+x+1}; x \in R$ is (2003S)
 - a) $(1, \infty)$
 - b) $(1, \frac{11}{7}]$
 - c) $(1, \frac{7}{3}]$
 - d) $(1, \frac{7}{5}]$
- 6) If $f(x) = x^2 + 2bx + 2c^2$ and $g(x) = -x^2 - 2cx + b^2$ such that $\min f(x) > \max g(x)$, then the relations between b and c , is (2003S)
 - a) no real value of $b \& c$
 - b) $0 < c < b\sqrt{2}$
 - c) $|c| < |b|\sqrt{2}$
 - d) $|c| > |b|\sqrt{2}$
- 7) If the function $f(x) = \sin x + \cos x, g(x) = x^2 - 1$, then $g(f(x))$ is invertible in the domain (2004S)
 - a) $[0, \frac{\pi}{2}]$
 - b) $[-\frac{\pi}{4}, \frac{\pi}{4}]$
 - c) $[-\frac{\pi}{2}, \frac{\pi}{2}]$
 - d) $[0, \pi]$
- 8) If the function $f(x)$ and $g(x)$ are defined on $R \rightarrow R$ such that (2005S)

$$f(x) = \begin{cases} 0, & x \in \text{rational} \\ x, & x \in \text{irrational} \end{cases}$$

$$g(x) = \begin{cases} 0, & x \in \text{rational} \\ x, & x \in \text{irrational} \end{cases}$$
 then $(f-g)(x)$ is
 - a) one-one & onto
 - b) neither one-one nor onto
 - c) one-one but not onto
 - d) onto but not one-one
- 9) X and Y are two sets and $f : X \rightarrow Y$. If $\{f(c) = y; c \in X, y \in Y\}$ and $\{f^{-1}(d) = X; d \in Y, x \in X\}$, then the true statement is (2005S)
 - a) $f(f^{-1}(b)) = b$
 - b) $f^{-1}(f(a)) = a$
 - c) $f(f^{-1}(b)) = b, b \subset Y$

d) $f^{-1}(f(a)) = a, a \subset x$

- 10) If $F(x) = \left(f\left(\frac{x}{2}\right)\right)^2 + \left(g\left(\frac{x}{2}\right)\right)^2$ where $f''(x) = -f(x)$ and $g(x) = f'(x)$ and given that $F(5) = 5$, then $F(10)$ is equal to (2006,-3M,-1)

- a) 5 c) 0
b) 10 d) 15

- 11) Let $f(x) = \frac{x}{(1+x^n)^{\frac{1}{n}}}$ for $n \geq 2$ and

$$g(x) = \underbrace{(f \circ f \circ \dots \circ f)(x)}_{f \text{ occurs } n \text{ times}}$$

.Then $\int x^{n-2}g(x)dx$ equals. (2007-3 marks)

- a) $\frac{1}{n(n-1)}(1+nx^n)^{1-\frac{1}{n}}$ c) $\frac{1}{n+1}(1+nx^n)^{1+\frac{1}{n}}$
b) $\frac{1}{n-1}(1+nx^n)^{1-\frac{1}{n}}$ d) $\frac{1}{n+1}(1+nx^n)^{1+\frac{1}{n}}$

- 12) Let f, g and h be real-valued functions defined on the interval $[0, 1]$ by $f(x) = e^{x^2} + e^{-x^2}, g(x) = xe^{x^2} + e^{-x^2}$ and $h(x) = x^2e^{-x^2}$. If a, b and c denote, respectively, the absolute maximum of f, g and h on $[0, 1]$, then (2010)

- a) $a = b$ and $b \neq c$ c) $a \neq b$ and $c \neq b$
b) $a = c$ and $a \neq b$ d) $a = b = c$

- 13) Let $f(x) = x^2$ and $g(x) = \sin x$ for all $x \in R$. Then the set of all x satisfying $(f \circ g \circ g \circ f)(x) = (g \circ g \circ f)(x)$, where $(f \circ g)(x) = f(g(x))$, is (2011)

- a) $\pm \sqrt{n\pi}, n \in \{0, 1, 2, \dots\}$
b) $\pm \sqrt{n\pi}, n \in \{1, 2, \dots\}$
c) $\frac{\pi}{2} + 2n\pi, n \in \{\dots - 2, -1, 0, 1, 2, \dots\}$
d) $2n\pi, n \in \{\dots - 2, -1, 0, 1, 2, \dots\}$

- 14) The function $f : [0, 3] \rightarrow [1, 29]$, defined by $f(x) = 2x^3 - 15x^2 + 39x + 1$, is (2012)

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

II. D: MCQs WITH ONE OR MORE THAN ONE CORRECT

- 1) If $y = f(x) = \frac{x+2}{x-1}$ then (2008S)

- a) $x = f(y)$
b) $f(1) = 3$
c) y increase with x for $x < 1$
d) f is a rational function on x