CH-10
Function

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I. C: MCQs with One correct Answer

20.Suppose $f(x) = f(x+1)^2$ for x ≥ -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)

1) $-\sqrt{x}-1$,x≥0
2) $\frac{1}{(x+1)^2}, x > -1$
3) $\sqrt{x+1}, x \geq -1$
4) $\sqrt{x}-1, x \geq 0$

21.Let function $f : R \to R$ be defined by $f(x) = 2x + \sin x$ for $x \in R$,then f is (2003S)

1) one-to-one and onto
2) one-to-one but not onto
3) onto but not not onto
4) neither one-to-one nor onto

22.If $f : [0,\infty) \to [0,\infty)$,and $f(x) = \frac{x}{1+x}$ then f is (2003S)

1) one-one and onto
2) one-one but not onto
3) onto but not one-one
4) neither one-one nor onto

23.Domain of definition of the functions $f(x) = \sqrt{\sin^{-1}(2x) + \frac{\pi}{6}}$ for real valued x,is (2003S)

1) $\left[-\frac{1}{4}, \frac{1}{2}\right]$
2) $\left[-\frac{1}{2}, \frac{1}{2}\right]$
3) $\left(-\frac{1}{2}, \frac{1}{9}\right)$
4) $\left[-\frac{1}{4}, \frac{1}{4}\right]$

24.Range of the function $f(x) = \frac{x^2+x+2}{x^2+x+1}; x \in R$ is (2003S)

1) $(1,\infty)$
2) $(1, \frac{11}{7}]$
3) $(1, \frac{7}{3}]$
4) $(1, \frac{7}{5}]$

25. 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)

1) no real value of b&c
2) $0 < c < b\sqrt{2}$
3) $|c| < |b|\sqrt{2}$
4) $|c| > |b|\sqrt{2}$

26.If the function $f(x) = \sin x + \cos x, g(x) = x^2 - 1$,then $g(f(x))$ is invertible in the domain (2004S)

1) $\left[0, \frac{\pi}{2}\right]$
2) $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$
3) $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
4) $[0, \pi]$

27.If the function $f(x)$ and $g(x)$ are defined on $R \to R$ such that (2005S)

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

$$g(x) = \begin{cases} 0, x \in rational \\ x, x \in irratoinal \end{cases}$$ then $(f-g)(x)$ is

1) one-one & onto
2) neither one-one nor onto
3) one-one but not onto
4) onto but not one-one

28. X and Y are two sets and $f : X \to Y$.If $\{f(c) = y; c \subset X, y \subset Y\}$ and $\{f^{-1}(d) = X; d \subset Y, x \subset X\}$,then the true statement is (2005S)

1) $f(f^{-1}(b)) = b$
2) $f^{-1}(f(a)) = a$
3) $f(f^{-1}(b)) = b, b \subset y$
4) $f^{-1}(f(a)) = a, a \subset x$

29.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)

1) 5
2) 10
3) 0
4) 15

30.Let $f(x)=\frac{x}{(1+x^n)^{\frac{1}{n}}}$ for $n\geq 2$ and $g(x)=\underbrace{(f\circ f\circ ...\circ f)(x)}_{\text{f occurs n times}}$.Then $\int x^{n-2}g(x)dx$ equals. (2007-3 marks)

1) $\frac{1}{n(n-1)}(1+nx^n)^{1-\frac{1}{n}}$
2) $\frac{1}{n-1}(1+nx^n)^{1-\frac{1}{n}}$
3) $\frac{1}{n+1}(1+nx^n)^{1+\frac{1}{n}}$
4) $\frac{1}{n+1}(1+nx^n)^{1+\frac{1}{n}}$

31. 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)

1) $a=b$ and $b\neq c$
2) $a=c$ and $a\neq b$
3) $a\neq b$ and $c\neq b$
4) $a=b=c$

32.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)

1) $\pm\sqrt{n\pi},n\in\{0,1,2....\}$
2) $\pm\sqrt{n\pi},n\in\{1,2,....\}$
3) $\frac{\pi}{2}+2n\pi,n\in\{...-2,-1,0,1,2...\}$
4) $2n\pi,n\in\{...-2,-1,0,1,2...\}$

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

1) one-one and onto
2) onto bit not one-one
3) one-one but not onto
4) 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)

1) $x=f(y)$
2) $f(1)=3$
3) y increase with x for $x<1$
4) f is a rational function on x