10/A/C/5-19

EE24BTECH11040 - Mandara Hosur

C. MCQs with One Correct Answer

5. If $f(x) = cos(lnx)$, then

$$f(x)f(y) - \frac{1}{2}\left[f\left(\frac{x}{y}\right) + f(xy)\right]$$

has the value

(1983 - 1 Mark)

(a) -1
(b) $\frac{1}{2}$
(c) -2
(d) none of these

6. The domain of definition of the function

$$y = \frac{1}{\log_{10}(1-x)} + \sqrt{x+2}$$

is

(1983 - 1 Mark)

(a) (-3, -2) excluding -2.5
(b) [0, 1] excluding 0.5
(c) [-2, 1) excluding 0
(d) none of these

7. Which of the following functions is periodic?

(1983 - 1 Mark)

(a) $f(x) = x - [x]$ where $[x]$ denotes the largest integer less than or equal to the real number x
(b) $f(x) = sin\frac{1}{x}$ for $x \neq 0$, $f(0) = 0$
(c) $f(x) = xcosx$
(d) none of these

8. Let $f(x) = sinx$ and $g(x) = ln|x|$. If the ranges of the composition functions fog and gof are R_1 and R_2 respectively, then

(1994 - 2 Marks)

(a) $R_1 = \{u : -1 \leq u < 1\}$, $R_2 = \{v : -\infty < v < 0\}$
(b) $R_1 = \{u : -\infty < u < 0\}$, $R_2 = \{v : -1 \leq v \leq 0\}$
(c) $R_1 = \{u : -1 < u < 1\}$, $R_2 = \{v : -\infty < v < 0\}$
(d) none of these

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(c) $R_1 = \{u : -1 < u < 1\}$, $R_2 = \{v : -\infty < v < 0\}$
(d) $R_1 = \{u : -1 \leq u \leq 1\}$, $R_2 = \{v : -\infty < v \leq 0\}$

9. Let $f(x) = (x+1)^2 - 1$, $x \geq -1$. Then the set $\{x : f(x) = f^{-1}(x)\}$ is

(1995)

(a) {0, -1, $\frac{-3+i\sqrt{3}}{2}$, $\frac{-3-i\sqrt{3}}{2}$}
(b) {0, 1, -1}
(c) {0, -1}
(d) empty

10. The function $f(x) = |px-q|+r|x|$, $x \in (-\infty, \infty)$ where $p > 0$, $q > 0$, $r > 0$ assumes its minimum value only on one point if

(1995)

(a) $p \neq q$
(b) $r \neq q$
(c) $r \neq p$
(d) $p = q = r$

11. Let $f(x)$ be defined for all $x > 0$ and be continuous. Let $f(x)$ satisfy $f\left(\frac{x}{y}\right) = f(x) - f(y)$ for all x, y and $f(e) = 1$. Then

(1995S)

(a) $f(x)$ is bounded
(b) $f\left(\frac{1}{x}\right) \to 0$ as $x \to 0$
(c) $xf(x) \to 1$ as $x \to 0$
(d) $f(x) = lnx$

12. If the function $f : [1,\infty) \to [1,\infty)$ is defined by $f(x) = 2^{x(x-1)}$, then $f^{-1}(x)$ is

(1999 - 2 Marks)

(a) $\left(\frac{1}{2}\right)^{x(x-1)}$
(b) $\frac{1}{2}\left(1 + \sqrt{1+4log_2x}\right)$
(c) $\frac{1}{2}\left(1 - \sqrt{1+4log_2x}\right)$
(d) not defined

13. Let $f : R \to R$ be any function. Define $g : R \to R$ by $g(x) = |f(x)|$ for all x. Then g is

(2000S)

(a) onto if f is onto
(b) one-one if f is one-one
(c) continuous if f is continuous
(d) differentiable if f is differentiable

14. The domain of definition of the function $f(x)$ given by the equation $2^x + 2^y = 2$ is

(2000S)

(a) $0 < x \leq 1$
(b) $0 \leq x \leq 1$
(c) $-\infty < x \leq 0$
(d) $-\infty < x < 1$

15. Let $g(x) = 1 + x - [x]$ and

$$f(x) = \begin{cases} -1, & x < 0 \\ 0, & x = 0. \\ 1, & x > 0 \end{cases} \tag{1}$$

Then for all x, $f(g(x))$ is equal to

(2001S)

(a) x
(b) 1
(c) $f(x)$
(d) $g(x)$

16. If $f : [1, \infty) \to [2, \infty)$ is given by $f(x) = x + \frac{1}{x}$ then $f^{-1}(x)$ equals

(2001S)

(a) $\frac{(x+\sqrt{x^2-4})}{2}$
(b) $\frac{x}{(1+x^2)}$
(c) $\frac{(x-\sqrt{x^2-4})}{2}$
(d) $1 + \sqrt{x^2 - 4}$

17. The domain of definition of $f(x) = \frac{log_2(x+3)}{x^2+3x+2}$ is

(2001S)

(a) $R\backslash\{-1, -2\}$
(b) $(-2, \infty)$
(c) $R\backslash\{-1, -2, -3\}$
(d) $(-3, \infty)\backslash\{-1, -2\}$

18. Let $E = \{1, 2, 3, 4\}$ and $F = \{1, 2\}$. Then the number of onto functions from E to F is

(2001S)

(a) 14
(b) 16
(c) 12
(d) 8

19. Let $f(x) = \frac{\alpha x}{x+1}$, $x \neq -1$. Then, for what value of α is $f(f(x)) = x$?

(2001S)

(a) $\sqrt{2}$
(b) $-\sqrt{2}$
(c) 1
(d) -1