

10/A/C/5-19

EE24BTECH11040 - Mandara Hosur

C. MCQs WITH ONE CORRECT ANSWER

5. If $f(x) = \cos(\ln x)$, 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) $f(x) = x \cos x$
- (d) none of these

8. Let $f(x) = \sin x$ and $g(x) = \ln|x|$. If the ranges of the composition functions $f \circ g$ and $g \circ f$ 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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(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) $f\left(\frac{1}{x}\right) \rightarrow 0$ as $x \rightarrow 0$
- (c) $xf(x) \rightarrow 1$ as $x \rightarrow 0$
- (d) $f(x) = \ln x$

12. If the function $f : [1, \infty) \rightarrow [1, \infty)$ 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) $\frac{1}{2} \left(1 + \sqrt{1 + 4 \log_2 x}\right)$
- (c) $\frac{1}{2} \left(1 - \sqrt{1 + 4 \log_2 x}\right)$
- (d) not defined

13. Let $f : R \rightarrow R$ be any function. Define $g : R \rightarrow R$ 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

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

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

(2001S)

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

16. If $f : [1, \infty) \rightarrow [2, \infty)$ 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) $R \setminus \{-1, -2\}$
- (b) $(-2, \infty)$
- (c) $R \setminus \{-1, -2, -3\}$
- (d) $(-3, \infty) \setminus \{-1, -2\}$

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