

# 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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(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)  $f\left(\frac{1}{x}\right) \rightarrow 0$  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  $\alpha$  is  $f(f(x)) = x$ ?

(2001S)

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