



- a)  $\frac{1}{2}\{f(2x) + f(2y)\}$     b)  $\frac{1}{2}\{f(2x) - f(2y)\}$     c)  $\frac{1}{4}\{f(2x) + f(2y)\}$     d)  $\frac{1}{4}\{f(2x) - f(2y)\}$
9. The relation  $R$  defined on the set of natural numbers as  $\{(a, b): a \text{ differs from } b \text{ by } 3\}$  is given by  
a)  $\{(1, 4), (2, 5), (3, 6), \dots\}$     b)  $\{(4, 1), (5, 2), (6, 3), \dots\}$   
c)  $\{(1, 3), (2, 6), (3, 9), \dots\}$     d) None of the above
10. The domain of the function  $f(x) = \sin^{-1}(\log_3(x/3))$  is  
a)  $[1, 9]$     b)  $[-1, 9]$     c)  $[-9, 1]$     d)  $[-9, -1]$
11. The range of the function  $f(x) = \sin\left\{\log_{10}\left(\frac{\sqrt{4-x^2}}{1-x}\right)\right\}$ , is  
a)  $[0, 1]$     b)  $(-1, 0)$     c)  $[-1, 1]$     d)  $(-1, 1)$
12. Let  $f(x) = \frac{ax+b}{cx+d}$ . Then,  $f \circ f(x) = x$  provided that  
a)  $d = -a$     b)  $d = a$     c)  $a = b = c = d = 1$     d)  $a = b = 1$
13. Let  $C$  denote the set of all complex numbers. The function  $f : C \rightarrow C$  defined by  $f(x) = \frac{ax+b}{cx+d}$  for  $x \in C$ , where  $bd \neq 0$  reduces to a constant function if:  
a)  $a = c$     b)  $b = d$     c)  $ad = bc$     d)  $ab = cd$
14. If  $\sin \lambda x + \cos \lambda x$  and  $|\sin x| + |\cos x|$  are periodic function with the same period, then  $\lambda =$   
a) 0    b) 1    c) 2    d) 4
15. The domain of definition of the real function  $f(x) = \sqrt{\log_{12} x^2}$  of the real variable  $x$ , is  
a)  $x > 0$     b)  $|x| \geq 1$     c)  $|x| \geq 4$     d)  $x \geq 4$
16. If  $f(x)$  is an even function and  $f'(x)$  exists, then  $f'(e) + f'(-e)$  is  
a)  $> 0$     b)  $= 0$     c)  $\geq 0$     d)  $< 0$
17. If  $f(x) = \log\left(\frac{1+x}{1-x}\right)$ , then  $f\left(\frac{2x}{1+x^2}\right)$  is equal to  
a)  $\{f(x)\}^2$     b)  $\{f(x)\}^3$     c)  $2f(x)$     d)  $3f(x)$
18. If the function  $f: R \rightarrow R$  is defined by  $f(x) = \cos^2 x + \sin^4 x$  then  $f(R) =$   
a)  $[3/4, 1)$     b)  $(3/4, 1]$     c)  $[3/4, 1]$     d)  $(3/4, 1)$
19. The domain of  $\sin^{-1}\left[\log_2\left(\frac{x}{12}\right)\right]$  is  
a)  $[2, 12]$     b)  $[-1, 1]$     c)  $\left[\frac{1}{3}, 24\right]$     d)  $[6, 24]$
20. The largest interval lying in  $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$  for which the function  $f(x) = 4^{-x^2} + \cos^{-1}\left(\frac{x}{2} - 1\right) + \log(\cos x)$  is defined, is  
a)  $[0, \pi]$     b)  $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$     c)  $\left[-\frac{\pi}{4}, \frac{\pi}{2}\right)$     d)  $\left[0, \frac{\pi}{2}\right)$