

CLASS: XIIth DATE:

SUBJECT: MATHS

DPP NO.: 3

Topic:- RELATIONS AND FUNCTIONS

- 1. The function $f(x) = \sin \frac{\pi x}{2} + 2 \cos \frac{\pi x}{3} \tan \frac{\pi x}{4}$ is periodic with period
 - a) 6

c) 4

d) 12

2. The equivalent definition of the function

$$f(x) = \lim_{n \to \infty} \frac{x^n - x^{-n}}{x^n + x^{-n}}, x > 0$$
, is

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

b)
$$f(x) = \begin{cases} -1, & 0 < x < 1 \\ 1, & x \ge 1 \end{cases}$$

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

- d) None of these
- Let $R = \{(1, 3), (4, 2), (2, 4), (2, 3), (3, 1)\}$ be a relation on the set $A = \{1, 2, 3, 4\}$. The relation R
 - a) A function
- b) Transitive
- c) Not symmetric
- d) Reflexive

- The domain of the function
- $f(x) = {}^{16-x}C_{2x-1} + {}^{20-3x}P_{4x-5}$, where the symbols have their usual meanings, is the set
 - a) $\{2, 3\}$
- b) $\{2, 3, 4\}$
- c) $\{1, 2, 3, 4\}$
- $d){1, 2, 3, 4, 5}$
- 5. If $f:R\to C$ is defined by $f(x)=e^{2ix}$ for $x\in R$, then f is (where C denotes the set of all complex numbers)
 - a) One-one

b) Onto

c) One-one and onto

d) Neither one-one nor onto

- The domain of the function
- $f(x) = \log_{10}(\sqrt{x-4} + \sqrt{6-x})$ is
 - a) [4, 6]
- b) $(-\infty, 6)$
- c) [2, 3)
- d) None of these
- 7. If $f(x) = \sin^2 x$, $g(x) = \sqrt{x}$ and $h(x) = \cos^{-1} x$, $0 \le x \le 1$, then

 - a) hogof = fogoh b) gofoh = fohog c) fohog = hogof
- d) None of these

8. If $f(x) = \frac{2^x + 2^{-x}}{2}$, then f(x + y)f(x - y) is equal to

1	
a) $\frac{1}{2}$ { $f(2x)$	+ f(2y)

b)
$$\frac{1}{2}$$
 { $f(2x) - f(2y)$ }

b)
$$\frac{1}{2}$$
{ $f(2x) - f(2y)$ } c) $\frac{1}{4}$ { $f(2x) + f(2y)$ } d) $\frac{1}{4}$ { $f(2x) - f(2y)$ }

$$d) \frac{1}{4} \{ f(2x) - f(2y) \}$$

The relation R defined on the set of natural numbers as $\{(a, b): a \text{ differs from } b \text{ by } 3\}$ is given by

c)
$$\{(1,3), (2,6), (3,9), ...\}$$

d) None of the above

10. The domain of the function $f(x) = \sin^{-1}(\log_3(x/3))$ is

b)
$$[-1, 9]$$

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

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) $a = b = 1$

d)
$$a = b = 1$$

13. Let *C* denote the set of all complex numbers. The function $f: C \to C$ 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 $\lambda =$

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)
$$|x| \ge 1$$

c)
$$|x| \ge 4$$

d)
$$x \ge 4$$

16. If f(x) is an even function and f'(x) exists, then f'(e) + f'(-e) is

a)
$$> 0$$

$$b) = 0$$

c)
$$\geq 0$$

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)
$$2f(x)$$

18. If the function $f:R \to R$ is defined by $f(x) = \cos^2 x + \sin^4 x$ then $f(R) = \cos^2 x + \sin^4 x$

19. The domain of $\sin^{-1} \left[\log_2 \left(\frac{x}{12} \right) \right]$ is

c)
$$\left[\frac{1}{3}, 24\right]$$

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

b)
$$\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$$

$$\left[-\frac{\pi}{4},\frac{\pi}{2}\right)$$

d)
$$[0, \frac{\pi}{2}]$$