# DPP
### DAILY PRACTICE PROBLEMS

CLASS : XIIth
DATE :

SUBJECT : MATHS
DPP NO. : 9

## Topic :- RELATIONS AND FUNCTIONS

1. Which of the following functions have period $2\pi$?

   a) $y = \sin\left(2\pi t + \frac{\pi}{3}\right) + 2\sin\left(3\pi t + \frac{\pi}{4}\right) + 3\sin 5\pi t$  b) $y = \sin\frac{\pi}{3}t + \sin\frac{\pi}{4}t$

   c) $y = \sin t + \cos 2t$

   d) None of the above

2. Let $f:A \rightarrow B$ be a function defined by $f(x) = \sqrt{3}\sin x + \cos x + 4$. If $f$ is invertible, then

   a) $A = [-2\pi/3, \pi/3], B = [2, 6]$

   b) $A = [\pi/6, 5\pi/6], B = [-2, 2]$

   c) $A = [-\pi/2, \pi/2], B = [2, 6]$

   d) $A = [-\pi/3, \pi/3], B = [2, 6]$

3. If $f:R \rightarrow R$ and $g:R \rightarrow R$ are defined by $f(x) = 2x + 3$ and $g(x) = x^2 + 7$, then the values of $x$ such that $g(f(x)) = 8$ are

   a) 1, 2          b) $-1, 2$          c) $-1, -2$          d) $1, -2$

4. The domain of definition of the function
   $f(x) = \sin^{-1}\left(\frac{x-3}{2}\right) - \log_{10}(4-x)$, is

   a) $1 \leq x \leq 5$          b) $1 < x < 4$          c) $1 \leq x < 4$          d) $1 \leq x \leq 4$

5. If $f(x) = \frac{1-x}{1+x}(x \neq -1)$, then $f^{-1}(x)$ equals to

   a) $f(x)$          b) $\frac{1}{f(x)}$          c) $-f(x)$          d) $-\frac{1}{f(x)}$

6. The function $f$ satisfies the functional equation $3f(x) + 2f\left(\frac{x+59}{x-1}\right) = 10x + 30$ for all real $x \neq 1$.
   The value of $f(7)$ is

   a) 8          b) 4          c) -8          d) 11

7. If $[x]$ denotes the greatest integer $\leq x$, then
   $\left[\frac{2}{3}\right] + \left[\frac{2}{3} + \frac{1}{99}\right] + \left[\frac{2}{3} + \frac{2}{99}\right] + \dots + \left[\frac{2}{3} + \frac{98}{99}\right]$ is equal to

   a) 99          b) 98          c) 66          d) 65

8. If $f(x)$ is defined on $[0, 1]$, then the domain of $f(3x^2)$, is

   a) $[0, 1/\sqrt{3}]$          b) $[-1/\sqrt{3}, 1/\sqrt{3}]$          c) $[-\sqrt{3}, \sqrt{3}]$          d) None of these

9. If $f:R \rightarrow S$, defined by $f(x) = \sin x - \sqrt{3}\cos x - 1$, is onto, then the interval of $s$ is

a) [0, 3]        b) [-1, 1]        c) [0, 1]        d) [-1, 3]

10. If $f(x) = e^x$ and $g(x) = \log_e x$, then which of the following is true?
   a) $f\{g(x)\} \neq g\{f(x)\}$        b) $f\{g(x)\} = g\{f(x)\}$
   c) $f\{g(x)\} + g\{f(x)\} = 0$        d) $f\{g(x)\} - g\{f(x)\} = 1$

11. The range of the function $f(x) = {}^{7-x}P_{x-3}$, is
   a) $\{1, 2, 3\}$        b) $\{1, 2, 3, 4, 5, 6\}$        c) $\{1, 2, 3, 4\}$        d) $\{1, 2, 3, 4, 5\}$

12. The domain of definition of $f(x) = \log_{1.7}\left(\frac{2-\phi'(x)}{x+1}\right)^{1/2}$, where $\phi(x) = \frac{x^3}{3} - \frac{3}{2}x^2 - 2x + \frac{3}{2}$, is
   a) $(-\infty, -4)$        b) $(-4, \infty)$        c) $(-\infty, -1) \cup (-1, 4)$        d) $(-\infty, -1) \cup (-1, 4]$

13. The domain of definition of the function
$f(x) = \sin^{-1}\left(\frac{4}{3 + 2\cos x}\right)$, is
   a) $\left[2n\pi - \frac{\pi}{6}, 2n\pi + \frac{\pi}{6}\right], n \in Z$
   b) $\left[0, 2n\pi + \frac{\pi}{6}\right], n \in Z$
   c) $\left[2n\pi - \frac{\pi}{6}, 0\right], n \in Z$
   d) $\left(2n\pi - \frac{\pi}{6}, 2n\pi + \frac{\pi}{6}\right), n \in Z$

14. Which of the following functions has period $2\pi$?
   a) $f(x) = \sin\left(2\pi x + \frac{\pi}{3}\right) + 2\sin\left(3\pi x + \frac{\pi}{4}\right) + 3\sin 5\pi x$
   b) $f(x) = \sin\frac{\pi x}{3} + \sin\frac{\pi x}{4}$
   c) $f(x) = \sin x + \cos 2x$
   d) None of these

15. Let $S$ be the set of all real numbers. Then, the relation $R = \{(a, b): 1 + ab > 0\}$ on $S$ is
   a) Reflexive and symmetric but not transitive      b) Reflexive and transitive but not symmetric
   c) Symmetric and transitive but not reflexive      d) Reflexive, transitive and symmetric

16. Which of the following functions is periodic?
   a) $f(x) = x + \sin x$      b) $f(x) = \cos\sqrt{x}$      c) $f(x) = \cos x^2$      d) $f(x) = \cos^2 x$

17. The function $f(x) = \max\{(1-x), (1+x), 2\}, x \in (-\infty, \infty)$ is equivalent to
   a) $f(x) = \begin{cases} 1-x, & x \le -1 \\ 2, & -1 < x < 1 \\ 1+x, & x \ge 1 \end{cases}$

   b) $f(x) = \begin{cases} 1+x, & x \le -1 \\ 2, & -1 < x < 1 \\ 1-x, & x \ge 1 \end{cases}$

   c) $f(x) = \begin{cases} 1-x, & x \le -1 \\ 1, & -1 < x < 1 \\ 1+x, & x \ge 1 \end{cases}$

d) None of these

18. The period of the function $f(\theta) = \sin\frac{\theta}{3} + \cos\frac{\theta}{2}$ is

    a) $3\pi$                  b) $6\pi$                  c) $9\pi$                  d) $12\pi$

19. Let the function $f(x) = x^2 + x + \sin x - \cos x + \log(1 + |x|)$ be defined on the interval $[0, 1]$. The odd extension of $f(x)$ to the interval $[-1, 1]$ is

    a) $x^2 + x + \sin x + \cos x - \log(1 + |x|)$

    b) $-x^2 + x + \sin x + \cos x - \log(1 + |x|)$

    c) $-x^2 + x + \sin x - \cos x + \log(1 + |x|)$

    d) None of these

20. If $g(x) = 1 + \sqrt{x}$ and $f(g(x)) = 3 + 2\sqrt{x} + x$ then, $f(x)$ is equal to

    a) $1 + 2x^2$            b) $2 + x^2$            c) $1 + x$            d) $2 + x$