CLASS XII ---- FUNCTIONS ---MATHEMATICS – 14 June 2020

1. The period of $f(x) = \frac{1}{2}[\cos(\sin x) + \cos(\cos x)]$ is
(A) π (B) $\pi/2$ (C) $\pi/4$ (D) 2π

2. Domain of $f(x) = \log_{\left[x+\frac{1}{2}\right]}(x^2 - x - 2)$ is , where [.] denotes the greatest integer function.
(A) $\left[\frac{3}{2}, \infty\right)$ (B) $(2, \infty)$ (C) $\left[\frac{3}{2}, 2\right)$ (D) $\left[\frac{3}{2}, 6\right)$

3. If $f(x) = \sin\{x\}$, $f: R \to R$, then f is
(A) periodic (B) one-one (C) many-one (D) bijective

4. If $f(x) = \sin \sqrt{[a]}\, x$, (where [.] denotes the greatest integer function), has π as it's fundamental period, then
(A) a = 1 (B) $a \in [1,2)$ (C) a = 9 (D) $a \in [4,5)$

5. The function $f(x) = \begin{cases} \{x\}, & x \geq 0 \\ \{-x\}, & x < 0 \end{cases}$ is ({.} : fractional part}
(A) even (B) odd (C) neither (D) Equal

6. The range of $y = \sqrt{\log_3(\cos(\sin x))}$ contain(s)
(A) one element (B) infinitely many elements
(C) the function is undefined (D) two elements

7. The domain and range of $f(x) = \frac{1}{2 - \cos 3x}$ are respectively
(A) $R - (2n+1)\frac{\pi}{3}$, R (B) R, R – [1/3, 1] (C) R, [1/3, 1] (D) R, [1/3, 2]

8. The equation x > [x] holds true for, where [-] denotes GIF
(A) all integral values of x (B) all $x \in R$ (C) all positive integers (D) R – I

9. The function and its inverse
(A) are symmetric about y = x line (B) meet each other along the line y = x
(C) are symmetric about y + x = 0 line (D) never intersect each other .

10. If $f(x) = \begin{cases} x \text{ when } x \text{ is rational} \\ 1 - x \text{ when } x \text{ is irrational} \end{cases}$, then fof (x) is given as
(A) 1 (B) x (C) 1 + x (D) x-1

11. Let $f(x) = \sin x + \cos\left(\sqrt{4 - a^2}\right)x$. Then the integral values of 'a' for which f(x) is a periodic function are given by
(A) {2, – 2} (B) [– 2, 2) (C) (–2, 2) (D) R

. Which of the following functions is /are periodic
(A) Sgn (e^{-x}) (B) sinx + |sinx| (C) min (sinx, |x|) (D) $\left[x + \frac{1}{2}\right] + \left[x - \frac{1}{2}\right] + 2[-x]$ Where [x] denotes the greatest integer function

13. The function defined as $f: [0, \pi] \to [-1, 1]$, f (x) = cos x is
(A) one-one onto (B) many-one onto (C) one-one into (D) many-one into

14. $y = \log_{|x|} |x|$, then find the domain
(A) R (B) R – {–1, 1} (C) R – {0} (D) R – {0, –1, 1}

15. The range of the function $f(x) = \frac{x^2}{x^4 + 1}$ is
(A) $\left(0, \frac{1}{2}\right)$ (B) $\left(0, \frac{1}{2}\right]$ (C) $(0, \infty)$ (D) (0, 2]

16. The graph of $y = x + \frac{1}{x}$ is symmetrical
(A) about x – axis (B) about y - axis
(C) in opposite quadrants (D) about y=1

17. The domain of $f(x) = \sin^{-1}(|x - 1| - 2)$ is
(A) $[-2, 0] \cup [2, 4]$ (B) $(-2, 0) \cup (2, 4)$ (C) $[-2, 0] \cup [1, 3]$ (D) $(-2, 0) \cup (1, 3)$

18. Minimum of $2^{|(x^2-3)^3+27|}$ is
(A) 2^{27} (B) 1 (C) 2 (D) 2^{-27}

19. The range of the function $f(x) = \frac{x - 3}{|x - 3|}$ is
(A) {–1, 1} (B) R (C) R – {3} (D) R – {–1}

20. The solution set of log {x} = 0 is
(A) {ϕ} (B) [1, –1] (C) (0, –1) (D) [0, 1]

21. If the period of the function $f(x) = \cos[\pi^2]x + \cos[-\pi^2]x$ is $k\pi$. Then value of k is

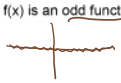
22. The period of the function $f(x) = \{\frac{\pi}{3}x\} + \sin x/3 + \tan 2x$ is

23. If f (x) = [x] and g (x) = |x|, then $g \circ f\left(\frac{5}{3}\right) - f \circ g\left(\frac{5}{3}\right)$ is

24. The number of distinct values of $f(x) = [x^3] - [x]^3$ for $\forall\, x \in [0, 2]$

24 The number of distinct values of f (x) = [x²] − [x]² for ∀ x ∈ [0, 2] = 2

25 If f(x) is an odd function also periodic function with period 2 then f(4) equal to



f(4) = f(2) = f(0) = 0

x = [0, 1) f(x) = 0 − 0 = 0 — (1)

0 ≤ x³ < 1

⇒ x = [1, 2) f(x) = [x³] − 1

1 ≤ x < 2 x³ = 1, f(x) = 0

1 ≤ x³ < 8 x = 2 f(x) = 1

x³ = 7 f(x) = 6

x³ = 8 f(x) = 7

{0, 1, 2, 3, 4, 5, 6} — 7

x = 2, f(x) = 0