FUNCTION

2. The domain of definition of $f(x) = \sec^{-1}(\cos^2 x)$ is
(A) $m\pi$, $m \in I$ (B) $\pi/2$
(C) $\pi/4$ (D) none of these.

7. Which of the following function(s) from $f : A \to A$ are invertible, where $A = [-1,1]$:
(A) $f(x) = x/2$ (B) $g(x) = \sin(\pi x/2)$
(C) $h(x) = |x|$ (D) $k(x) = x^2$

8 Solution of $0 < |x-3| \le 5$ is
(A) [-2,8] (B) [-2,3) U (3,8] (C) [-2,3) (D) none of these

9. Solution of $\frac{(x-3)(x+5)(x-7)}{|x-4|(x+6)} \le 0$ is
(A) (-6,-5] U [3, 7) U (4, 7) (B) [3,7]
(C) (-6,-5] (D) [3,4) (4,7]

13 If $f(x) = \sin^{-1}\left(\frac{x^2}{1+x^2}\right)$ then the range of f(x) is
(A) $[-\pi/2,\pi/2]$ (B) $[0,\pi/2]$
(C) $[0,\pi/2)$ (D) $[-\pi/2,0)$

14. If the period of $\frac{\sin(nx)}{\tan(x/n)}$, where $n \in I$, is 6π, then
(A) n = 4 (B) n = -3
(C) n = 3 (D) none of these

19 Period of $|\sin 2x| + |\cos 8x|$ is:
(A) $\pi/2$ (B) $\pi/8$
(C) $\pi/16$ (D) None of these.

40 Range of $f(x) = \sin^{-1}\sqrt{x^2+x+1}$ is
(A) $\left[\frac{\pi}{3}, \frac{\pi}{2}\right]$ (B) $\left[\frac{\pi}{3}, \frac{\pi}{4}\right]$
(C) $\left(\frac{\pi}{3}, \frac{\pi}{2}\right]$ (D) none of these

46 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

55. Period of the function $|\cos 2x|$ is
(A) 2π (B) π
(C) $\frac{\pi}{2}$ (B) $\frac{\pi}{4}$

57. If $f(x) = x^2$, $g(x) = \sqrt{x}$, then what is g o f (x) is
(A) |x| (B) x
(C) –x (D) –|x|

63. If f (x) = $\frac{1}{1-x}$, then f [f {f (x)}] is

(A) x – 1 (B) 1 – x
(C) x (D) –x

1. $\lim_{x\to 0}\frac{x\tan 2x - 2x\tan x}{(1-\cos 2x)^2}$ is

(A) 2 (B) –2 (C) 1/2 (D) –1/2

4. f(x) = $\begin{cases} ax^2+bx+c, & |x|>1 \\ x+1, & |x|\le 1 \end{cases}$. If f(x) is continuous for all values of x, then;

(A) b = 1, a + c = 0 (B) b = 0, a + c = 2
(C) b = 1, a + c = 1 (D) none of these

5. The equation of the tangent to the curve f (x) = $1 + e^{-2x}$ where it cuts the line y = 2 is

(A) x + 2y = 2 (B) 2x + y = 2
(C) x – 2y = 1 (D) x – 2y + 2 = 0

10. $\lim_{x\to 0}\frac{1-\cos x}{x^2}$ is equal to

(A) π (B) 1/4
(C) 1/2 (D) 1

11 $\lim_{x\to\infty}\frac{\sqrt{x^2-1}}{2x+1}$ is equal to

(A) 1 (B) 0
(C) -1 (D) 1/2

12. $\lim_{x\to 0}\frac{x}{\tan^{-1}2x}$ is equal to

(A) 0 (B) 1/2
(C) 1 (D) ∞

13. If $f(x) = (1-x^n)^{1/n}$, $0 < x < 1$, n being an odd positive integer and h(x) = f(f(x)), then $h'\left(\frac{1}{2}\right)$ is equal to

(A) 2^n (B) 2
(C) $n.\ 2^{n-1}$ (D) 1

17 The number of points of non differentiability for the function f (x) = |log |x|| are

(A) 2 (B) 4
(C) 5 (D) 3

18 $\lim_{x\to 0}\frac{|x|}{x}$ =

(A) 0 (B) 1
(C) –1 (D) doesn't exist

22 Function f (x) = tan x is continuous in the interval

(A) $R - \left\{(2n+1)\frac{\pi}{2} : n \in I\right\}$ (B) $R - \{n\pi : n \in I\}$
(C) R^+ (D) R – {0}

27 The value of $\lim_{x\to\infty} x\cos\left(\frac{\pi}{4x}\right)\sin\left(\frac{\pi}{4x}\right)$ is

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{4}$ (C) 1 (D) π

31 The value of $\lim_{x\to 0}\frac{a^x - b^x}{x}$ is

(A) $\log_e\left(\frac{a}{b}\right)$ (B) $\log_e\left(\frac{b}{a}\right)$ (C) $\log_e(ab)$ (D) none of these

32 If $f(x) = \begin{cases} mx+1, & x \le \frac{\pi}{2} \\ \sin x + n, & x > \frac{\pi}{2} \end{cases}$ is continuous at $x = \frac{\pi}{2}$, then

(A) m = 1, n = 0 (B) $m = \frac{n\pi}{2} + 1$ (C) $n = \frac{m\pi}{2}$ (D) $m = n = \frac{\pi}{2}$

34. The value of $\lim_{x\to\infty}\frac{\sqrt{1+x^4} - (1+x^2)}{x^2}$ is equal to

(A) 0 (B) –1
(C) 2 (D) 1

3. Area of the triangle formed by the positive x-axis and the normal and the tangent to $x^2 + y^2 = 4$ at $(1, \sqrt{3})$ is

(A) $2\sqrt{3}$ sq. units (B) $\sqrt{3}$ sq. units
(C) $4\sqrt{3}$ sq. units (D) none of these

4. A tangent to the curve $y = \frac{x^2}{2}$ which is parallel to the line y = x cuts off an intercept from the y-axis is

(A) 1 (B) –1/3
(C) 1/2 (D) –1/2

5. A particle moves on a co-ordinate line so that its velocity at time t is $v(t) = t^2 - 2t$ m/sec. Then distance travelled by the particle during the time interval $0 \le t \le 4$ is

(A) 4/3 (B) 3/4
(C) 16/3 (D) 8/3

11. The greatest and least values of the function $f(x) = ax + b\sqrt{x} + c$, when a > 0, b > 0, c > 0 in the interval [0,1] are

(A) a+b+c and c (B) a/2 b√2+c, c
(C) $\frac{a+b+c}{\sqrt{2}}$, c (D) None of these

12. The absolute minimum value of $x^4 - x^2 - 2x + 5$

(A) is equal to 5 (B) is equal to 3
(C) is equal to 7 (D) does not exist

13. Through the point P (α, β) where $\alpha\beta > 0$ the straight line $\frac{x}{a} + \frac{y}{b} = 1$ is drawn so as to form with co-ordinates axes a triangle of area S. If ab >0, then the least value of S is

(A) $2\alpha\beta$ (B) $1/2\ \alpha\beta$
(C) $\alpha\beta$ (D) None of these