SUB-MATHEMATICS

CHAPTER:-LIMITS & DERIVATIVES

CLASS:-XI

WORKSHEET (BASIC)

1. Find: $\lim\limits_{x\to 0}\dfrac{3\sin x-\sin 3x}{x^3}$

2. Find: $\lim\limits_{x\to 0}\dfrac{e^x-\sin x-1}{x}$

3. Find: $\lim\limits_{x\to \frac{\pi}{4}}\dfrac{\cos x-\sin x}{\cos 2x}$

4. If $f(x)=\left(\cos\dfrac{x}{2}+\sin\dfrac{x}{2}\right)^2$, find $f'\left(\dfrac{\pi}{4}\right)$.

5. Find $f'(-3)$, if $f(x)=x-\dfrac{1}{x}$.

6. Find: $\lim\limits_{x\to -1}\dfrac{x^3+1}{x^2-1}$

7. Find: $\lim\limits_{x\to \pi}\dfrac{\sin x}{\pi-x}$

   (a) 1 (b) 0 (c) -1 (d) π

8. Find: $\lim\limits_{x\to 0}\dfrac{\sin x^3}{x}$

   (a) 1 (b) 0 (c) ∞ (d) does not exist

9. The value of $\lim\limits_{x\to 0} x\sin\dfrac{1}{x}$ is

   (a) 1 (b) 0 (c) ∞ (d) does not exist

10. The value of $\lim\limits_{x\to 0}\dfrac{\tan x-4\tan 2x-3\tan 3x}{x}$ is

    (a) - 6 (b) 0 (c) – 16 (d) 1

11. If $y=\dfrac{1}{ax^2+b}$, then $\dfrac{dy}{dx}$ is

    (a) $\dfrac{-a}{(ax^2+b)^2}$ (b) $\dfrac{-2a}{(ax^2+b)^2}$ (c) $\dfrac{-2ax}{(ax^2+b)^2}$ (d) $\dfrac{-ax}{(ax^2+b)^2}$

12. If $y=(3x+7)^5$, then $\dfrac{dy}{dx}$ is

    (a) $3(3x+7)^4$ (b) $5(3x+7)^4$ (c) $15(3x+7)^4$ (d) none of these

SECTION – B

13. Find: $\lim_{x\to 0}\dfrac{\sin x - 2\sin 3x + \sin 5x}{x^3}$

14. Find: $\lim_{x\to 1}\dfrac{1-x^{-1/3}}{1-x^{-2/3}}$

15. Find: $\lim_{x\to 0}\dfrac{(1+x)^6-1}{(1+x)^2-1}$

16. Find: $\lim_{x\to 0}\dfrac{3^{2+x}-9}{x}$

17. Find: $\lim_{x\to a}\dfrac{\cos x - \cos a}{x-a}$

18. Find: $\lim_{x\to 1}\dfrac{x^7-2x^5+1}{x^3-3x^2+2}$

19. Find the value of k so that $\lim_{x\to 2} f(x)$ exists where f(x)= $\begin{cases} 2x+3, & x \le 2 \\ x+k, & x > 2 \end{cases}$

20. Find $\dfrac{dy}{dx}$ if $y = \dfrac{1+\dfrac{1}{x^2}}{1-\dfrac{1}{x^2}}$

21. Find $\dfrac{dy}{dx}$ if $y = \sqrt{\dfrac{\sec 2x - 1}{\sec 2x + 1}}$

22. Find $\dfrac{dy}{dx}$ if $y = \sqrt{\dfrac{1+\sin x}{1-\sin x}}$

23. Find $\dfrac{dy}{dx}$ if $y = \dfrac{x^2-5x+9}{x-1}$

24. Find $\dfrac{dy}{dx}$ if $y = (9x^2 + \sin x)(p + q\cos x)$

25. If $y = \dfrac{x}{x+5}$, prove that $x\dfrac{dy}{dx} = y(1-y)$

26. If $y = a\sin x + b\cos x$, prove that $y^2 + \left(\dfrac{dy}{dx}\right)^2 = a^2 + b^2$.

27. For $f(x) = x^2 - 6x + 8$, prove that $f'(5) - 3f'(2) = f'(8)$