

## SELF ASSESSMENT TEST -5

### CLASS 10+2

1. Find the principal value of (a)  $\cos^{-1}\left(\frac{-1}{2}\right)$  (b)  $\sin^{-1}\left(\sin \frac{2\pi}{3}\right)$

2. Prove that  $\tan^{-1}\left(\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right) = \frac{\pi}{4} - \frac{1}{2}\cos^{-1}x$

3. Prove that  $\tan^{-1}\frac{1}{4} + \tan^{-1}\frac{2}{9} = \frac{1}{2}\tan^{-1}\frac{4}{3}$

4. If  $A = \begin{bmatrix} 2 & 1 & 3 \\ 4 & 1 & 0 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & -1 \\ 0 & 2 \\ 5 & 0 \end{bmatrix}$ , verify  $(AB)^t = B^t A^t$ .

5. If  $x, y, z$  if  $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$ , prove that  $1+xyz=0$

6. Prove that  $\begin{vmatrix} 1+a^2-b^2 & 2ab & -2b \\ 2ab & 1-a^2+b^2 & 2a \\ 2b & -2a & 1-a^2-b^2 \end{vmatrix} = (1+a^2+b^2)^3$

7. If  $A = \begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$ , find  $x$  and  $y$  s.t.  $A^2 + xI = YA$ . Hence find  $A^{-1}$

8. Verify  $(AB)^{-1} = B^{-1}A^{-1}$  where  $A = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ ,  $B = \begin{bmatrix} 6 & 8 \\ 7 & 9 \end{bmatrix}$

9. Solve the system of eqns.;  $\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 4$ ,  $\frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 1$ ,  $\frac{6}{x} + \frac{9}{y} - \frac{20}{z} = 2$

10. Discuss the cont.  $f(x) = \begin{cases} \frac{\sin x}{x} + \cos x & x > 0 \\ 2 & x = 0 \\ \frac{4(1 - \sqrt{1-x})}{x} & x < 0 \end{cases}$  at  $x=0$

11. Discuss the cont.  $f(x) = \begin{cases} \frac{|x-2|}{2-x} & x \neq 2 \\ 1 & x = 2 \end{cases}$  at  $x=2$

12. Find k if  $f(x) = \begin{cases} k \sin 2x & x \neq 0 \\ \frac{\pi - 2x}{3} & x = 0 \end{cases}$  cont at  $x=0$

13. Find a and b if  $f(x) = \begin{cases} x+2 & \text{if } x \leq 2 \\ ax+b & \text{if } 2 < x < 5 \\ 3x-2 & \text{if } x \geq 5 \end{cases}$  cont. at  $x = 2, x=5$

14. Prove that  $f(x) = |x-1|$  is not diff. at  $x=1$ .

15. Prove that  $f(x) = [x]$  is not diff. at  $x=2$

16. If  $\sin y = x \sin(a+y)$  prove that

17. Diff.  $\log(x + \sqrt{x^2 + 1})$  w.r.t.x

18. If  $y = \log(\sqrt{x-1} - \sqrt{x+1})$  show that  $\frac{dy}{dx} = \frac{1}{2\sqrt{x^2-1}}$

19. Diff.  $\log \frac{x^2 + x + 1}{x^2 - x + 1}$  w.r.t.x

20. Diff.  $\log\left(\frac{a + b \sin x}{a - b \sin x}\right)$  w.r.t.x

21. If  $y = \log \tan x$  then  $\frac{dy}{dx} = \frac{2}{\sin 2x}$

22. Diff.  $(\tan x)^x + (\sin x)^{\frac{1}{x}}$  w.r.t.x

23.If  $x^y = y^x$ , prove that  $\frac{dy}{dx} = \frac{\frac{y}{x} - \log y}{\frac{x}{y} - \log x}$

24.If  $x^5 y^4 = (x+y)^9$  prove that  $\frac{dy}{dx} = \frac{y}{x}$

25.Diff.  $(x+2)^2(x+3)^4(x+7)^5$  w.r.t.x

26.Diff.  $|2x^2 - 1|$  w.r.tx

27.Find  $\frac{dy}{dx} \quad xy + x e^{-y} + y e^x = x^2$

28.If  $y = x \sin(a+y)$ , prove that  $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin(a+y) - y \cos(a+y)}$

29. Diff.  $\tan^{-1}\left(\frac{\sqrt{1+x^2} - \sqrt{1-x^2}}{\sqrt{1+x^2} + \sqrt{1-x^2}}\right)$  w.r.t. x

30. If  $y = \tan^{-1}\left(\frac{5ax}{a^2 - 6x^2}\right)$  prove that  $\frac{dy}{dx} = \frac{3a}{a^2 + 9x^2} + \frac{2a}{a^2 + 4x^2}$

