7. $\frac{d}{dx}\left\{Tan^{-1}\left(\frac{a\sin x+b\cos x}{a\cos x-b\sin x}\right)\right\}=$

1. 0 2. 1 3. -1 4. $\frac{1}{1+x^2}$

8. $\frac{d}{dx}\left\{\cot^{-1}\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right\}=$

1. $\frac{1}{\sqrt{1-x^2}}$ 2. $\frac{-1}{2\sqrt{1-x^2}}$

3. $\frac{1}{1+x^2}$ 4. $\frac{-1}{2(1+x^2)}$

9. $\frac{d}{dx}\left\{Tan^{-1}\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right\}=$

1. 0 2. 1 3. $\frac{1}{2}$ 4. $\frac{-1}{2}$

10. $\frac{d}{dx}\left\{\sin^{-1}\frac{2x}{1+x^2}+\sec^{-1}\frac{1+x^2}{1-x^2}\right\}=$

1. $\frac{1}{1+x^2}$ 2. $\frac{2}{1+x^2}$ 3. $\frac{4}{1+x^2}$ 4. $\frac{-1}{1+x^2}$

11. $\frac{d}{dx}\left\{Tan^{-1}\frac{4x}{1+5x^2}+Tan^{-1}\frac{2+3x}{3-2x}\right\}=$

1. $\frac{1}{1+25x^2}$ 2. $\frac{5}{1+25x^2}$ 3. $\frac{1}{1+5x^2}$ 4. $\frac{5}{1+5x^2}$

12. If y= $Tan^{-1}\left(\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right)$ then $\frac{dy}{dx}$ =

1. $\frac{1}{\sqrt{1-x^2}}$ 2. $\frac{1}{2\sqrt{1-x^2}}$ 3. $\frac{-1}{\sqrt{1-x^2}}$ 4. $\sqrt{\frac{1-x}{1+x}}$

13. If y= $\cos^{-1}\left(\frac{x-x^{-1}}{x+x^{-1}}\right)$ then $\frac{dy}{dx}$ =

1. $\frac{-2}{1+x^2}$ 2. $\frac{2}{1+x^2}$ 3. $\frac{1}{1+x^2}$ 4. $\frac{-1}{1+x^2}$

14. Given $\tan\frac{y}{2}=\sqrt{\frac{1-x}{1+x}}$ then $\frac{dy}{dx}$ =

1. $\frac{1}{\sqrt{1-x^2}}$ 2. $\frac{1}{x\sqrt{1-x^2}}$

3. $\frac{-1}{\sqrt{1-x^2}}$ 4. $\frac{-1}{x\sqrt{1-x^2}}$

15. If y= $Tan^{-1}\left(\frac{x-\sqrt{a^2-x^2}}{x+\sqrt{a^2-x^2}}\right)$ then $\frac{dy}{dx}$ =

1. $\frac{1}{\sqrt{a^2+x^2}}$ 2. $\frac{1}{\sqrt{a^2-x^2}}$

3. $\frac{-1}{\sqrt{a^2-x^2}}$ 4. $\frac{-1}{\sqrt{a^2+x^2}}$

16. If y= $\sin^{-1}\left(2\sqrt{a^2x^2-a^4x^4}\right)$ then $\frac{dy}{dx}$ =

1. $\frac{2a}{\sqrt{1-a^2x^2}}$ 2. $\frac{a}{\sqrt{1-a^2x^2}}$

3. $\frac{-a}{\sqrt{1-a^2x^2}}$ 4. $\frac{a}{2\sqrt{1-a^2x^2}}$

17. If y= $\frac{\sin^{-1}x}{\sqrt{1-x^2}}$ then $(1-x^2)\frac{dy}{dx}-xy=$

1. 1 2. $\frac{1}{2}$ 3. -1 4. 0

18. If y= $Tan^{-1}\frac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}$ then $\frac{dy}{dx}$ =

1. $\frac{-x}{\sqrt{1-x^4}}$ 2. $\frac{x}{\sqrt{1-x^4}}$ 3. $\frac{1}{\sqrt{1-x^4}}$ 4. 0

19. $\frac{d}{dx}\left[\cot^2\left(Tan^{-1}\frac{1}{\sqrt{x^2-1}}\right)\right]=$

1. $\frac{x}{2}$ 2. -x 3. 2x 4. $\frac{2}{x}$

20. $\frac{d}{dx}\left[\sin^2\left(\cot^{-1}\sqrt{\frac{1+x}{1-x}}\right)\right]=$

1. 1 2. -1 3. $\frac{1}{2}$ 4. $\frac{-1}{2}$

21. $\frac{d}{dx}\left(\sin\left(2Tan^{-1}\sqrt{\frac{1-x}{1+x}}\right)\right)=$

1. $\frac{-x}{\sqrt{1-x^2}}$ 2. $\frac{x}{\sqrt{1-x^2}}$

3. $\frac{1}{x\sqrt{1-x^2}}$ 4. $\frac{-1}{x\sqrt{1-x^2}}$

22. $\frac{d}{dx}\left(\sin^{-1}\left\{\frac{\sqrt{1+x}+\sqrt{1-x}}{2}\right\}\right)=$

1. $\frac{-1}{2\sqrt{1-x^2}}$ 2. $\frac{1}{2\sqrt{1-x^2}}$

3. $\frac{1}{\sqrt{1-x^2}}$ 4. $\frac{-1}{\sqrt{1-x^2}}$

23. $\frac{d}{dx}\left(\sin^{-1}\left\{\frac{x^2}{\sqrt{x^4+a^4}}\right\}\right)=$

1. $\frac{2a^2x^2}{a^4+x^4}$ 2. $\frac{2a^2x}{a^4+x^4}$ 3. $\frac{ax}{a^4+x^4}$ 4. $\frac{-ax}{a^4+x^4}$

24. $\frac{d}{dx}\left(\sqrt{\sec^{-1}x^2}\right)=$

1. $\frac{1}{x\sqrt{\sec^{-1}x^2}.\sqrt{x^4-1}}$ 2. $\frac{x}{\sqrt{\sec^{-1}x^2}.\sqrt{x^4-1}}$

3. $\frac{-1}{x\sqrt{\sec^{-1}x^2}.\sqrt{x^4-1}}$ 4. $\frac{-1}{\sqrt{\sec^{-1}x^2}.\sqrt{x^4-1}}$

25. $\frac{d}{dx}\{\log_{10}(\sin^{-1}x^2)\}=$

1. $\frac{1}{\log_{10}.(\sin^{-1}x^2).\sqrt{1-x^4}}$

2. $\frac{2x}{\log_{10}.(\sin^{-1}x^2).\sqrt{1-x^4}}$

3. $\frac{-1}{\log_{10}.(\sin^{-1}x^2).\sqrt{1-x^4}}$

4. $\frac{2}{\log_{10}.(\sin^{-1}x^2).\sqrt{1-x^4}}$

26. $\frac{d}{dx}\left(x\sqrt{a^2-x^2}+a^2\sin^{-1}\frac{x}{a}\right)=$

1. $\sqrt{a^2-x^2}$ 2. $2\sqrt{a^2-x^2}$

3. $\sqrt{a^2+x^2}$ 4. $2\sqrt{a^2+x^2}$

27. $\frac{d}{dx}\left(Tan^{-1}\left(\frac{b}{a}\tan x\right)\right)=$

1. $\frac{ab\sec^2 x}{a^2+b^2\tan^2 x}$ 2. $\frac{ab\sec^2 x}{a\tan^2 x+b^2}$

3. $\frac{-ab\sec^2 x}{a^2\tan^2 x+b^2}$ 4. $\frac{ab\sec^2 x}{a^2\tan^2 x+b^2}$

28. $\frac{d}{dx}\left(Tanh^{-1}(\sin x)\right)=$

1. secx 2. cosecx 3. cotx 4. tanx

29. $\frac{d}{dx}\left(Tanh^{-1}(\sinh x)\right)=$

1. cosechx 2. sechx 3. sinhx 4. coshx

30. $\frac{d}{dx}\left(x\sqrt{x^2-a^2}-a^2\cosh^{-1}\frac{x}{a}\right)=$

1. $2\sqrt{x^2-a^2}$ 2. $\frac{1}{2\sqrt{x^2-a^2}}$

3. $\sqrt{x^2-a^2}$ 4. $\frac{1}{\sqrt{x^2-a^2}}$

31. $\frac{d}{dx}\left(Tanh^{-1}\left(\frac{x^2-1}{x^2+1}\right)\right)=$

1. x 2. -x 3. x^2 4. $\frac{1}{x}$

32. $\frac{d}{dx}\left[\sqrt{\frac{\sec x+\tan x}{\sec x-\tan x}}\right]=$

1) $\frac{1}{2}\sqrt{\frac{\sec x+\tan x}{\sec x-\tan x}}$ 2) $\frac{1}{2}\sqrt{\frac{\sec x-\tan x}{\sec x+\tan x}}$

3) $\sec x(\sec x+\tan x)$ 4) secx(secx-tanx)

33. y= $\log_{\cot x}\tan x\log_{\tan x}\cot x+\tan^{-1}\frac{4x}{4-x^2}$ then $\frac{dy}{dx}=$

1) $\frac{1}{4+x^2}$ 2) $\frac{4}{4+x^2}$ 3) $\frac{1}{4-x^2}$ 4) $\frac{4}{4-x^2}$

34. If y = $\cot^{-1}\left(1+x^2-x\right), then\frac{dy}{dx}=$

1) $\frac{1}{1+x^2}+\frac{1}{1+(x-1)^2}$ 2) $\frac{1}{1+(x-1)^2}-\frac{1}{1+x^2}$

3) $\frac{1}{1+x^2}-\frac{1}{1+(x-1)^2}$ 4) $-\frac{1}{1+x^2}-\frac{1}{1+(x-1)^2}$

35. $\frac{d}{dx}\left[\frac{e^{\sin\sqrt{x}}+e^{-\sin\sqrt{x}}}{e^{\sin\sqrt{x}}-e^{-\sin\sqrt{x}}}\right]=$

1) $\frac{-\frac{2}{\sqrt{x}}\cos\sqrt{x}}{\left(e^{\sin\sqrt{x}}-e^{-\sin\sqrt{x}}\right)^2}$ 2) $\frac{-\frac{2}{\sqrt{x}}\cos\sqrt{x}}{e^{\sin\sqrt{x}}}$

3) $\frac{-2\cos\sqrt{x}}{e^{\sin\sqrt{x}}}$ 4) $\frac{2\cos\sqrt{x}}{e^{\sin\sqrt{x}}}$

36. $\frac{d}{dx}\left[\tanh^{-1}\left(\frac{2x}{1+x^2}\right)\right]=$

1) $\frac{2}{1-x^2}$ 2) $\frac{2}{x^2-1}$ 3) $\frac{2}{1+x^2}$ 4) $\frac{-2}{x^2+1}$

37. $y=2^{\frac{x}{\log x}}$, then $\frac{dy}{dx}$ at x = e is

1) e 2) $2^e\log_2$ 3) $\log_2$ 4) 0

38. If $y=7^{\log_7\left(\tan^{-1}\frac{2x}{1-x^2}\right)}+e^{\log\left(\sin^{-1}x+\sec^{-1}\frac{1}{x}\right)}$, then $\frac{dy}{dx}=$

1) $\frac{2}{1+x^2}$ 2) $\frac{-1}{1+x^2}$ 3) $\frac{1}{1+x^2}$ 4) 0

39. If $y = 2^x$, $\log_{10}2=0.301$, $\log_e 2 = 0.693$, $\log_{10}e=\frac{1}{2.3026}$, then $\frac{dy}{dx}=$

1) $(0.301)2^x$ 2) $\frac{2^x}{2.3026}$ 3) $(0.693)\,q^x$ 4) $(0.693)2^x$

40. If $2^x + 2^y = 2^{x+y}$ then $\frac{dy}{dx}=$

1. -2^{y-x} 2. -2^{x-y} 3. 2^{y-x} 4. 2^{x-y}

41. If $x^y + y^x = k$ then $\frac{dy}{dx}=$

1. $\frac{-(yx^{y-1}+y^x\log y)}{(x^y\log x+xy^{x-1})}$ 2. $\frac{(yx^{y-1}+y^x\log y)}{(x^y\log x+xy^{x-1})}$

3. $\frac{-(x^y\log x+xy^{x-1})}{(yx^{y-1}+y^x\log y)}$ 4. $\frac{(x^y\log x+xy^{x-1})}{(yx^{y-1}+y^x\log y)}$

42. If $x=\frac{3at}{1+t^2}$, $y=\frac{3at^2}{1+t^2}$ then $\frac{dy}{dx}=$

1. $\frac{2t}{1-t^2}$ 2. $\frac{2t}{t^2-1}$ 3. $2t(t^2-1)$ 4. $-2t(t^2-1)$

43. If $x=\frac{a(1-t^2)}{(1+t^2)}$, $y=\frac{2bt}{1+t^2}$ then $\frac{dy}{dx}=$

1. $\frac{b(t^2-1)}{2at}$ 2. $\frac{b(1-t^2)}{2at}$

3. $\frac{2at}{b(1+t^2)}$ 4. $\frac{2at}{b(t^2-1)}$

44. If $x=\theta.\sin 2\theta$, $y=\theta\cos 2\theta$ then $\frac{dy}{dx}$ at $\theta=\frac{\pi}{4}$ is

1. $\frac{1}{2}$ 2. $\frac{-1}{2}$ 3. $\frac{\pi}{2}$ 4. $\frac{-\pi}{2}$

45. If x=SintCos2t, y=Cos t Sin 2t, then $\frac{dy}{dx}$ at $t=\frac{\pi}{4}$ is

1. -2 2. 2 3. $\frac{-1}{2}$ 4. $\frac{1}{2}$

46. If $x^2 + y^2 = t + \frac{1}{t}$ and $x^4 + y^4 = t^2 + \frac{1}{t^2}$ then $x^3y\frac{dy}{dx}=$

1. 0 2. 1 3. -1 4. 2

47. If $x=a\cos^2 2t$, $y=b\sin^2 2t$, then $\frac{dy}{dx}$ at $t=\frac{18\pi}{5}$ is

1. $\frac{a}{b}$ 2. $\frac{-b}{a}$ 3. $\frac{b}{a}$ 4. $\frac{-a}{b}$

48. If $x=a\sin 2\theta(1+\cos 2\theta)$, $y=b\cos 2\theta(1-\cos 2\theta)$, then $\frac{dy}{dx}=$

1. $\frac{a}{b}\tan\theta$ 2. $\frac{b}{a}\tan\theta$ 3. $\frac{a}{b}\cot\theta$ 4. $\frac{b}{a}\cot\theta$

49. If $x=\cos^{-1}\frac{1}{\sqrt{1+t^2}}$ and $y=\sin^{-1}\frac{1}{\sqrt{1+t^2}}$ then $\frac{dy}{dx}=$

1. 1 2. $\frac{1}{2}$ 3. $\frac{-1}{3}$ 4. -1

50. If $x=\cos^{-1}\left(\frac{1}{\sqrt{1+t^2}}\right)$, $y=\sin^{-1}\left(\frac{t}{\sqrt{1+t^2}}\right)$ Then $\frac{dy}{dx}=$

1) 0 2) 1 3) -1 4) 2

51. $x=\sqrt{\frac{1-t^2}{1+t^2}}$, $y=\frac{\sqrt{1+t^2}-\sqrt{1-t^2}}{\sqrt{1+t^2}+\sqrt{1-t^2}}$ then $\frac{dy}{dx}=$

1) $\frac{1-x}{1+x}$ 2) $\frac{-2}{(1+x)^2}$ 3) $\frac{2}{(1+x)^2}$ 4) $\frac{1+x}{1-x}$

52. If $x=\frac{1+t}{t^3}$ and $y=\frac{3+4t}{2t^2}$ then $x(y')^3=$

1) 1-y' 2) 1+y' 3) y' - 1 4) y'

53. If $y=\sin x\left[\frac{1}{\sin x.\sin 2x}+\frac{1}{\sin 2x.\sin 3x}+K\frac{1}{\sin x.\sin(n+1)x}\right]$ then $\frac{dy}{dx}=$

1) cotx - cot(n+1)x

2) $(n+1)\operatorname{cosec}^2(n+1)x-\operatorname{cosec}^2 x$

3) $\operatorname{cosec}^2 x-(n+1)\operatorname{cosec}^2(n+1)x$

4) cotx + cot(n+1)x

54. $\frac{d}{dx}\left[\sin^{-1}\left(x\sqrt{1-x}+\sqrt{x-x^3}\right)\right]=$

1) $\frac{1}{\sqrt{1+x^2}}+\frac{1}{2\sqrt{x-x^3}}$ 2) $\frac{1}{\sqrt{1-x^2}}+\frac{1}{\sqrt{1-x}}$

3) $\frac{1}{\sqrt{1-x^2}}+\frac{1}{2\sqrt{x-x^2}}$ 4) $\frac{1}{\sqrt{1-x^2}}-\frac{1}{x\sqrt{1+x^2}}$

55. $\frac{d}{dx}\left[\sin^{-1}\left(\frac{3+4x}{5\sqrt{1+x^2}}\right)\right]=$

1) $\frac{1}{1+x^2}$ 2) $-\frac{1}{1+x^2}$ 3) $\frac{1}{\sqrt{1-x^2}}$ 4) $\frac{1}{\sqrt{1+x^2}}$

56. If y = $\frac{(2x-1)^{2/3}(x-5)^{3/5}}{(x^2-1)^{1/2}(3x+1)^{1/3}}$, then $\frac{dy}{dx}$ =

1) $y\left[\frac{4}{3(2x-1)}+\frac{3}{5(x-5)}-\frac{x}{x^2-1}-\frac{1}{3x+1}\right]$

2) $y\left[\frac{2}{3(2x-1)}+\frac{3}{5(x-5)}-\frac{x}{x^2-1}-\frac{1}{3x+1}\right]$

3) $y\left[\frac{4}{3(2x-1)}+\frac{3}{5(x-5)}-\frac{2x}{x^2-1}-\frac{1}{3x+1}\right]$

4) $-y\left[\frac{4}{3(2x-1)}+\frac{3}{5(x-5)}-\frac{2x}{x^2-1}-\frac{1}{3x+1}\right]$

57. If y = $e^{x+e^{x+e^{x+\dots\infty}}}$, then $\frac{dy}{dx}$ =

1) y 2) $\frac{1}{y}$ 3) $\frac{1}{1-y}$ 4) $\frac{y}{1-y}$

58. Let f(x) = x^n, n being a positive integer. The value of n for which $f^I(a+b) = f^I(a) + f^I(b)$, when a, b > 0 is
1) 1 2) 2 3) 3 4) 4

59. If $f(x)=|x-2|,\ g(x)=f(f(x))$, then for x > 2, $g^I(x)$ =
1) 0 2) 1 3) -1 4) 2

60. $\frac{d}{dx}(x+a)(x^2+a^2)(x^4+a^4)(x^8+a^8)=$

1) $\frac{15x^{16}-16ax^{15}+a^{16}}{(x-a)^2}$ 2) $\frac{x^{16}-ax^{15}+a^{16}}{(x-a)^2}$

3) $\frac{x^{16}-a^{16}}{x-a}$ 4) $\frac{x-a}{x^{16}-a^{16}}$

61. If $\sqrt{\frac{\upsilon}{\mu}}+\sqrt{\frac{\mu}{\upsilon}}=6,\ then\ \frac{d\upsilon}{d\mu}=$

1) $\frac{17\mu-\upsilon}{\mu-17\upsilon}$ 2) $\frac{\mu-17\upsilon}{17\mu-\upsilon}$

3) $\frac{17\mu+\upsilon}{\mu-17\upsilon}$ 4) $\frac{\mu+17\upsilon}{17\mu-\upsilon}$

62. If $\cos^{-1}\left(\frac{x^2-y^2}{x^2+y^2}\right)=\log a\ \ then\ \frac{dy}{dx}=$

1) $-\frac{x}{y}$ 2) $-\frac{y}{x}$ 3) $\frac{y}{x}$ 4) $\frac{x}{y}$

63. If f is a differentiable function, f(1) = 0, $f^1(1)=\frac{3}{5}$ and y = $f(e^{2x})e^x$, then $\left(\frac{dy}{dx}\right)_{x=0}$ =

1) $\frac{3}{10}$ 2) $\frac{3}{5}$ 3) 1 4) $\frac{6}{5}$

64. f : R $\to$ R is a function f(1) = 2, f(2) = 6 and f(x+y) = f(x) + kxy - $2y^2$ for all x, y $\in$ R then
1) $f^1(x)$ = f(x) 2) $f^1(x)$ = 6f(x)
3) $f^1(x)$ = 6 4) $f^1(x)$ = 6x

65. If $f(x)=(x-a)g(x)$ and g(x) is continuous at x = a then $f^1(a)$ =
1) a g(a) 2) $g^1(a)$ 3) g(a) 4) a $g^1(a)$

66. Let f : R $\to$ R such that for all 'x' and y in R |f(x) - f(y)| $\leq$ $|x - y|^3$ then f(x) =
1) e^x 2) e^{-x} 3) x 4) 'c'(constant)

67. $\phi(x)=f(x)g(x)\ and\ f'(x)g'(x)=k$, then $\frac{2k}{f(x)g(x)}=$

1) $\frac{\phi''(x)}{\phi(x)}-\frac{f''(x)}{f(x)}-\frac{g''(x)}{g(x)}$

2) $\frac{\phi''(x)}{\phi(x)}+\frac{f''(x)}{f(x)}+\frac{g''(x)}{g(x)}$

3) $\frac{\phi''(x)}{\phi(x)}+\frac{f''(x)}{f(x)}-\frac{g''(x)}{g(x)}$

4) $\frac{\phi''(x)}{\phi(x)}-\frac{f''(x)}{f(x)}+\frac{g''(x)}{g(x)}$

68. If f(x+y) = f(x) f(y) and f(x) = 1 + tan2x g(x) where g(x) is continuous, then $f^1(x)$=

1) f(x) g(0) 2) $\frac{1}{2}$f(x) g(0)
3) 2f(x) g(0) 4) 2f(x) $g^1(0)$

69. If f(x) is differentiable function such that $(f(x))^n$ = f(nx), $\forall$ x, then f(x).$f^1(nx)$ =
1) f(x) f(nx) 2) $f^1(nx)\, f^1(x)$
3) $f^1(nx)$ f(x) 4) f(nx) $f^1(x)$

70. If g(x) be the inverse of f(x) and $f^1(x) = \frac{1}{1+x^2}$, then $g^1(x)$ =

1) $1+x^2$ 2) $1+(g(x))^2$

3) $\frac{1}{1+(g(x))^2}$ 4) $\frac{1}{1+x^2}$

71. If f(x) = $\frac{g(x)+g(-x)}{2}+\frac{2}{[h(x)+h(-x)]^{-1}}$ where g and h are differentiable functions then $f^1(0)$ =

1) 1 2) 0 3) $\frac{1}{2}$ 4) $\frac{3}{2}$

72. If f(x+y) = f(x)f(y) and f(x) = 1+x g(x) H(x) where $\underset{x\to 0}{Lt}\, g(x)=2$ and $\underset{x\to 0}{Lt}\, H(x)=3$, then $f^1(x)$ =

1) f(x) 2) 2f(x) 3) 3f(x) 4) 6f(x)

73. If $\frac{d}{dx}\left(\frac{1+x^2+x^4}{1+x+x^2}\right)=\mathbf{a}x+b$, then (a, b) =

1) (-1, 2) 2) (-2, 1) 3) (2, -1) 4) (1, 2)

74. Let f and g be two differentiable functions satisfying g'(a) = 2, g(a) = b and fog = I (Identity) then $f^1(b)$ =

1) 1/2 2) 2 3) 2/3 4) 1

75. $f(x)=\begin{cases}1, x<0\\ 1+\sin x, 0\le x\le \frac{\pi}{2}\end{cases}$, then the derivative of f(x) at x= 0 is

1) 1 2) 0
3) -1 4) does not exists

76. If $y=\frac{1}{x}-\left(\frac{1}{x^2}\right)+\left(\frac{1}{x^3}\right)-\left(\frac{1}{x^4}\right)+.....\infty$ (x>1) then $\frac{dy}{dx}$ =

1) $\frac{1}{1+x}$ 2) $\frac{-1}{1+x^2}$ 3) $\frac{-1}{(1+x)^2}$ 4) $\frac{-1}{1+x}$

77. If y= $1+2x+3x^2+4x^3+.......\infty$ then $\frac{dy}{dx}$ =

1. $\frac{1}{(1-x)^3}$ 2. $-\frac{1}{(1-x)^3}$

3. $\frac{2}{(1-x)^3}$ 4. $-\frac{2}{(1-x)^3}$

78. $\frac{d}{dx}\left\{e^{x^e}+x^{e^x}+e^{x^x}\right\}$ =

1. $e^{x^e}+x^{e^x}+e^{x^x}$
2. $x^2.e^{x^e}+e^x.x^{e^x}+x^x.e^{x^x}$
3. $e.e^{x^e}x^{e-1}+x^{e^x}.e^x\left(\frac{1}{x}+\log x\right)+e^{x^x}.x^x(1+\log x)$
4. $e.e^{x^e}x^{e-1}+x^{e^x}.e^x\left(\frac{1}{x}-\log x\right)+e^{x^x}.x^x(1-\log x)$

79. If $y=\cfrac{x}{a+\cfrac{x}{b+\cfrac{x}{a+\cfrac{x}{b+.........+to\ \infty}}}}$ then $\frac{dy}{dx}$ =

1. $\frac{1}{a(2y+b)}$ 2. $\frac{b}{a(2y+b)}$

3. $\frac{1}{ab(2y+b)}$ 4. $\frac{ab}{(2y+b)}$

80. Let f(x)= $x\left(\sqrt{x}-\sqrt{x+1}\right)$ then
1. f(x) is continuous but not differentiable at x=0
2. f(x) is differentiable at x=0
3. f(x) is not differentiable at x=0
4. f(x) is discontinuous at x=0

81. Consider f(x) = $\frac{x^2}{|x|}$, $x\neq 0$,
= 0, x=0
1. f(x) is discontinuous every where
2. f(x) is continuous every where
3. $f^1(x)$ exists in (-1, 1)
4. $f^1(x)$ exists in (-2, 2)

82. If f(x) = -x when x < 0
= x^2 when $0\le x\le 1$
= $x^3 - x + 1$ when x>1 then
1. $f^1(0)=0$, $f^1(1)=1$
2. $f^1(0)=-1$, $f^1(1)$ does not exist
3. $f^1(1)=2$, $f^1(0)$ does not exist
4. $f^1(0)$, $f^1(1)$ does not exist

83. If f(9)=9, $f^1(9)=4$, then $\underset{x\to 9}{Lt}\frac{\sqrt{f(x)}-3}{\sqrt{x}-3}$ =

1. 3 2. 4 3. 9 4. 27

84. If y = $\log_7\log_7 x$ then $\frac{dy}{dx}$ =

1. $\frac{1}{x\log x}$ 2. $\frac{\log_7 e}{x\log x}$

3. $\frac{(\log_7 e)^2}{x\log x}$ 4. $\frac{1}{\log_7 e.x\log x}$

85. If y=$\log_5\log_5(\sin 2x)$ then $\frac{dy}{dx}$ =

1. $\frac{2\log_5 e.\cot 2x}{\log(\sin 2x)}$ 2. $\frac{\log_5 e.\cot 2x}{\log(\sin 2x)}$

3. $\frac{1}{\log_e .\cot 2x.\log(\sin 2x)}$

4. $\frac{-1}{\log_e .\cot 2x.\log(\sin 2x)}$

86. If y= $\log\log\left(x+\sqrt{1+x^2}\right)$ then $\frac{dy}{dx}$ =

1. $\frac{1}{x+\sqrt{1+x^2}}$ 2. x $\log\left(x+\sqrt{1+x^2}\right)$

3. $\frac{-1}{\log\left(x+\sqrt{1+x^2}\right)}$

4. $\frac{1}{\sqrt{1+x^2}\log\left(x+\sqrt{1+x^2}\right)}$

87. If $a^y = \log_a(x^2+x+1)$ then $\frac{dy}{dx}$ =

1. $\frac{\log_a e.(2x+1)}{(x^2+x+1)\log(x^2+x+1)}$

2. $\frac{(2x+1)}{(x^2+x+1)\log(x^2+x+1)}$

3. $\frac{1}{(x^2+x+1)\log(x^2+x+1)}$

4. $\frac{-1}{(x^2+x+1)\log(x^2+x+1)}$

88. If f(x)=$\log_x\log_e x$ then $f^1(e)$=

1. 0 2. 1 3. e 4. $\frac{1}{e}$

89. If ylog(xy)=x then $\frac{dy}{dx}$ =

1. $\frac{(x-y)}{x(x+y)}$ 2. $\frac{y(x-y)}{x(x+y)}$ 3. $\frac{x(x+y)}{y(x-y)}$ 4. x(x+y²)

90. If $x^y = y^x$ then $\frac{dy}{dx}$ =

1. $\frac{-y(y-x\log y)}{x(y\log x-x)}$ 2. $\frac{y(y-x\log y)}{x(y\log x-x)}$

3. $\frac{-x(y\log x-x)}{y(y-x\log y)}$ 4. $\frac{x(y\log x-x)}{y(y-x\log y)}$

91. $\frac{d}{dx}\left\{\left(x^x\right)^x\right\}$ =

1. $\left(x^x\right)^x$ {x(1+logx)} 2. $\left(x^x\right)^x$ .x(1-2logx)

3. $\left(x^x\right)^x$ (1+2logx)x 4. $\left(x^x\right)^x$ .x²(1-2logx)

92. $\frac{d}{dx}\left\{\left(\frac{x}{n}\right)^{nx}\right\}$ =

1. $\left(\frac{x}{n}\right)^{nx}$ (1+lognx) 2. n.$\left(\frac{x}{n}\right)^{nx}$.log$\left(\frac{ex}{n}\right)$

3. $\left(\frac{x}{n}\right)^{nx}$ log$\left(\frac{ex}{n}\right)$ 4. $\frac{1}{n}\left(\frac{x}{n}\right)^{nx}$.log$\left(\frac{ex}{n}\right)$

93. If y = $\log\cos\left(\tan^{-1}\left(\frac{e^x-e^{-x}}{2}\right)\right)$, then $\frac{dy}{dx}$ =

1) -tanhx 2) sinhx 3) coshx 4) cothx

94. $\frac{d}{dx}\left[\log_e\left\{\left(e^x+2\right)+\sqrt{e^{2x}+4e^x+5}\right\}\right]=$

1) $\frac{1}{\sqrt{e^{2x}+4e^x+5}}$ 2) $\frac{e^x}{\sqrt{e^{2x}+4e^x+5}}$

3) $\frac{e^x}{\sqrt{e^{2x}+4e^x+3}}$ 4) $\frac{-e^x}{\sqrt{e^{2x}+4e^x+3}}$

95. If $f(x)=\begin{cases}\frac{x\log\cos x}{\log(1+x^2)}, & x\neq 0\\ 0 & x=0\end{cases}$, then f(x) is

1) continuous at x = 0
2) discontinuous at x = 0
3) continuous but not differentiable at x = 0
4) differentiable at x = 0

96. The function $f(x)=|x^3|$ is
1. Differentiable at x = 0
2. Continuous but not differentiable at x = 0
3. Discontinuous at x = 0
4. A function with range $(-\infty,\infty)$

97. $\frac{d}{dx}\left[(Cosx)^{\log x}+(\log x)^x\right]=$

1. $(\log x)^x\left[\frac{1}{\log x}+\log(\log x)\right]+(Cosx)^{\log x}\left[\frac{1}{x}\log\cos x-\log x.Tanx\right]$

2. $(Cos\,x)^{\log x}\left[\log(\cos x)-\cot x.\log x\right]+(\log x)^x\left[1+\log(\log x)\right]$

3. $\left((\cos x)^{\log x}+(\log x)^x\right)\left[\log x.\cos x+x\log x\right]$

4. $(\log x)^x\left[\log x+\log(\log x)\right](Cosx)^{\log x}$

98. If f (x) = (ax + b) Cos x + (cx + d) Sinx and $f^1(x) = x\,\text{Cos}x$ is an identity in x then a, b, c, d are given by

1. a = b = c = d   2. 0, 1, -1, 0
3. 1, 0, -1, 0   4. 0, 1, 1, 0

99. If $g(x) = 1/x \int_2^x \{3t - 2g^1(t)\}dt$ then

$g^1(2) =$

1. - 2/3   2. - 3/2   3. 2/3   4. 3/2

100. The set of points where the function $f(x) = x|x|$ is differentiable is

1. $(0,\infty)$ 2. $(-\infty,0)$ 3. $(-\infty,\infty)$ 4. ϕ

101. $\int_{\pi/2}^{x}\sqrt{3-2\sin^2 t}\,dt + \int_0^y \cos t\,dt = 0$ then $\left(\frac{dy}{dx}\right)_{(\pi,\pi)}$

1. $-\sqrt{3}$ 2. $\frac{-1}{\sqrt{3}}$ 3. $\frac{1}{\sqrt{3}}$ 4. $\sqrt{3}$

102. If $(\cos x)^y = (\sin y)^x$ then $\frac{dy}{dx} =$

1. $\frac{\log Sin\,y + y\,Tan\,x}{\log Cos\,x - x\,Cot\,y}$

2. $\frac{\log Sin\,y - y\,Tan\,x}{\log Cos\,x + Cot\,y}$

3. $\frac{\log\sin y}{\log\cos x}$ 4. $\frac{\log\cos x}{\log\sin y}$

103. If $f\left(\frac{x+y}{2}\right) = \frac{f(x)+f(y)}{2}$ for all x, $y \in R$ and $f^1(0) = -1, f(0) = 1$ then f (x) =

1. $\frac{1}{2}$ 2. 1   3. -1   4. - 1/2

104. $\frac{d}{dx}\left\{e^{1/2\log\left(1-Tanh_x^{\,2}\right)} + 3^{1/2\log_3\left(\cot h^2x-1\right)}\right\} =$

1. $\frac{-\left(\sin h^3x + \cos h^3x\right)}{\cos h^2x \sin h^2x}$

2. $\frac{Sin\,h^3x + \cos h\,3x}{\cos h^2x \sin h^2x}$

3. $\frac{\sin h^2x + \cos h^2x}{\sin h^2x \cos h^2x}$ 4. $\sec h^2x \cos h^2x$

105. The function $f(x) = \frac{x}{1+|x|}$ is differentiable on

1. $(0,\infty)$ 2. $[0,\infty)$
3. $(-\infty,0)$ 4. All the above

106. The derivative of the function $f(x) = \sqrt{x^2 - 2x + 1}$ on the interval [0,2] is

1. -1   2. 1
3. 0   4. Does not exist

107. Let $f = \begin{cases} ax^2 + 1 & \text{for } x > 1 \\ x + a & \text{for } x \le 1 \end{cases}$ then f is derivable at x = 1 if

1. a = 0   2. $a = \frac{1}{2}$
3. a = 1   4. a = 2

108. If $f(x) = \sqrt{1 - \sqrt{1 - x^2}}$ then f (x) is

1. Continuous on [-1,1] and differentiable on (-1,1)
2. Continuous on [-1,1] and differentiable on $(-1,0) \cup (0,1)$
3. Continuous and differentiable on [-1, 1]
4. Continuous and differentiable on (-1,1)

109. Let [x] denotes the greatest integer less than or equal to x and $f(x) = \lfloor \tan^2 x \rfloor$ then

1. $\underset{x\to 0}{Lt}\, f(x)$ does not exist
2. f (x) is continuous at x = 0
3. f (x) is not differentiable at x = 0
4. $f^1(0) = 1$

KEY

1. 3	2. 4	3. 3	4. 3
5. 3	6. 1	7. 2	8. 2
9. 4	10. 3	11. 2	12. 2
13. 1	14. 3	15. 2	16. 1
17. 1	18. 1	19. 3	20. 4
21. 1	22. 1	23. 2	24. 1
25. 2	26. 2	27. 1	28. 1
29. 2	30. 1	31. 4	32. 3
33. 2	34. 3	35. 1	36. 1
37. 4	38. 1	39. 4	40. 1
41. 1	42. 1	43. 1	44. 4
45. 4	46. 2	47. 2	48. 2
49. 4	50. 2	51. 2	52. 2
53. 2	54. 3	55. 1	56. 1
57. 4	58. 2	59. 2	60. 1
61. 2	62. 3	63. 4	64. 4
65. 3	66. 4	67. 1	68. 3
69. 4	70. 2	71. 2	72. 4
73. 3	74. 1	75. 4	76. 3
77. 3	78. 3	79. 2	80. 2
81. 2	82. 3	83. 2	84. 2
85. 1	86. 4	87. 1	88. 4
89. 2	90. 1	91. 3	92. 2
3. 1	94. 2	95. 4	96.1
97.1	98.4	99.4	100.3
101.2	102.1	103.3	104.1
105.4	106.4	107.2	108.2
109.2			

HINTS

1. Rationalise the function and differentiate w.r.t. 'x'
3. square the function and express 'y' as a function of 'x' and use F_5.
5. Use F_{34}.
8. Substitute x=Cos θ and simplify.
11. Use F_{46}.
15. Substitute x=aCos θ and simplify.
18. Substitute x^2=Cos θ and simplify.
19. Substitute x=Sec θ and simplify.
20. Substitute x=Cos θ and simplify.
23. Substitute $x^2=a^2$Tan θ and simplify.
24. Use F_{21}.
25. Change the base of the function to 'e' and use F_{45}, F_{51}.
26. Substitute x=asin θ and simplify
27. Use F_{47}
28. Use F_{47}
29. Use F_{47}
30. Substitute x=acosh θ and simplify
32. Rationalise the function and simplify
34. Express 'y' as

$$\text{Tan}^{-1}\left(\frac{1}{1+x(x-1)}\right)=\text{Tan}^{-1}\left(\frac{x+(1-x)}{1-x(1-x)}\right)$$

and use F_{46}

35. Express the function as Coth(Sin $\sqrt{x}$) and simplify.
37. Use F_{38} and simplify.
38. Since Tan$^{-1}\frac{2x}{1-x^2}$ =2Tan^{-1}x,

Sin^{-1}x+Sec$^{-1}\left(\frac{1}{x}\right)=\frac{\pi}{2}$ simplify using F_7

39. Use F_{15} and simplify.
40. Use F_{34}.
41. Use F_{34}.
42. Use F_6.
43. Given parametric equations represent equation of an Ellipse. Find $\frac{dy}{dx}$ and express in terms of 't'
46. Eliminate 't' from the given equations and differentiate w.r.t. 'x'.
48. Use F_6
49. Substitute t=Tan θ and simplify.
51. Apply componendo and dividendo to 'x' and express 'y' as a function of 'x' eliminating 't', then simplify
53. Express 'y' as cotx-cot(n+1)x and differentiate.
54. Express 'y' as

$$\text{Sin}^{-1}\left(x\sqrt{1-x^2}+\sqrt{x}\sqrt{1-x^2}\right) = \text{Sin}^{-1}x + \text{Sin}^{-1}\sqrt{x}$$

and simplify.

55. Substitute x=Tan θ and simplify.
56. Using logarithmic differentiation.
57. Express $y=e^{x+y}$ and use F_{34}.
60. Multiply and divide the function by (x-a) and simplify.
61. Use F_{34}.
62. Express the function $\left(\frac{x^2-y^2}{x^2+y^2}\right)$ as Cos(loga).

Applying componendo and dividendo the result can be obtained.

63. Use F_{39}
66. $\underset{x\to y}{\text{Lt}}\frac{|f(x)-f(y)|}{|x-y|}\le|x-y|^2$

$f^1(x) = 0$

$\Rightarrow$ f(x) = constant

67. Differentiate ϕ (x)=f(x).g(x) two times and simplify.
68. $f^1(x) = f(x)\, f^1(0)$, but $f^1(0) = 2g(0)$

$f^1(x) = 2f(x)\, g(0)$.

70. f(g(x)) = x

$\Rightarrow f^1(g(x)).g^1(x)=1$

$\Rightarrow \frac{1}{1+g^2(x)}\, g^1(x)=1$

$\Rightarrow g^1(x) = 1 + g^2(x)$

71. Since f(x) is an even function $f^1(0)=0$.
72. $f^1(x) = \underset{h\to 0}{\text{Lt}}\frac{f(x+h)-f(x)}{h}$

$= f(x)\underset{h\to 0}{\text{Lt}}\frac{1+hf(h)H(h)-1}{h}$

= 6f(x).

76. Express 'y' as $\frac{x}{x+1}$ and differentiate w.r.t. 'x'.
77. Use F_{35}.
79. Express 'y' as $\frac{x}{x+\frac{x}{b+y}}$ and differentiate w.r.t. 'x'.
82. Evaluate $\underset{x\to 1}{\text{Lt}}\frac{f(x)-f(1)}{x-1}$ and $\underset{x\to 0}{\text{Lt}}\frac{f(x)-f(0)}{x}$.
84. Express the function as $7^y = \log_7 x$ and simplify.
86. Use F_{42}
87. Use F_{42} after changing the base to 'e'.
89. Use F_{34}.
90. Using logarithmic differentiation.
91. Use F_{36}.
92. Use F_{36}
93. Express 'y' as logCosTan^{-1}(Sinhx) = log(Sechx) and simplify.
94. Express

$\log\left\{\left(e^x+2\right)+\sqrt{(e^x+2)^2+1}\right\}$ as $\text{Sinh}^{-1}(e^x+2)$

and simplify.

95. Evaluate $\underset{x\to 0}{\text{Lt}}\frac{f(x)-f(0)}{x}$.

LEVEL- IV
NEW PATTERN QUESTIONS

1. Assertion (A) : derivative of $\frac{\tan^{-1}x}{1+\tan^{-1}x}$ with respect to $\tan^{-1}$x is $\frac{1}{\left(1+\tan^{-1}x\right)^2}$

Reason (R) : Derivative of $\frac{x}{1+x}$ with respect to x is $\frac{1}{(1+x)^2}$.

1. A is correct R is wrong
2. A is wrong R is correct
3. A is correct R is correct and R is the correct explanation of A.
4. A is correct R is correct but R is not the correct explanation of A.

2. Assertion (A) :The derivative of $(\log x)^x$ w.r.t x is $(\log x)^{x-1}\left[1+\log x\log(\log x)\right]$

Reason (R) : $\frac{d}{dx}\left\{f(x)^{g(x)}\right\}=f(x)^{g(x)}$

$$\left[g(x)\frac{f^1(x)}{f(x)}+g^1(x)\log(f(x))\right]$$

1. Both A and R are true R is correct reason of A
2) Both A and R are true R is not correct reason of A
3) A is true but R is false
4) A is false but R is true

3. Assertion (A) :If $y=x^2+\cfrac{1}{x^2+\cfrac{1}{x^2+...\infty}}$, then $\frac{dy}{dx}=\frac{2xy^2}{y^2+1}$

Reason (R) : If $y=f(x)+\frac{1}{y}$ then $\frac{dy}{dx}=\frac{y^2.f^1(x)}{y^2+1}$.

1. Both A and R are true R is correct reason of A
2. Both a and R are true R is not correct reason of A
3. A is true but R is false
4. A is false but R is true.

4. Assertion (A) : If $\sin(x+y)=\log_e(x+y)$ then $\frac{dy}{dx}=-1$

Reason (R) : The derivative of an odd function is always an even function

1. Both A and R are true R is correct reason of A
2. Both A and R are true R is not correct reason of A
3. A is true but R is false
4. A is false but R is true

5. Assertion (A) : f(x) be twice differen tiable function such that $f^{||}(x)$ = - f(x) and $f^{|}(x)$ = g (x).

If $h(x)=[f(x)]^2+[g(x)]^2, h(1)=8$ then h (2) = 8

Reason (R) : Derivative of constant function is zero.

1. Both A and R are true R is correct reason of A
2. Both A and R are true R is not correct reason of A
3. A is true but R is false
4. A is flase but R is true

6. Assertion (A) : $f(x)=\sin(\pi[x])$ is differrentiable every where [.] is greatest integer function

Reason (R) : If $x=n\pi\Rightarrow\sin x=0\forall n\in z$ then

1. Both (A) and (R) are true and R is correct explanation for A
2. Both (A) and (R) are true and R is not correct explanation for A
3. (A) is true (R) is false
4. (A) is false (R) is true

7. Statement I : If $f(x)=\mathrm{Cos}^{-1}\left(\frac{1-(\log x)^2}{1+(\log x)^2}\right)$ then $f^1(e)=2e^{-1}$

Statement II : If $f^1(x)=0\ \forall\ x\in(a,b)$ then f(x) is constant $\forall\ x\in[a,b]$

Which of the above statements is correct

1. Only I 2. Only II
3. Both I and II 4. Neither I nor II

8. Statement I : If $f(\theta)=\cos\theta_1.\cos\theta_2....\cos\theta_n$ then the value of

$$\tan\theta_1+\tan\theta_2+...+\tan\theta_n=\frac{-f^1(\theta)}{f(\theta)}$$

Statement II : Differential coefficient of the function

$f(g(x))$ w.r.t to the function $g(x)$ is $f^1(g(x))$

Which of the above statements is correct

1. I only 2. II only
3. Both I and II 4. Neither I nor II

9. Statement I : If $x = e^{y+e^{y+e^{Y+....\infty}}}$ then $\frac{dy}{dx} = \frac{x}{1-x}$

Statement II : If $y = |\cos x| + |\sin x|$ then the value of $\frac{dy}{dx}$ at $x = \frac{2\pi}{3}$ is $\left(\frac{\sqrt{3}-1}{2}\right)$

Which of the above statments is correct

1. I only 2. II only
3. Both I and II 4. Neither I nor II

10. Statement I : If $x = \sin\theta + \theta\cos\theta$, $y = \cos\theta - \theta\sin\theta$, then $\left(\frac{dy}{dx}\right)_{\theta=\pi/2} = 1$

Statement II : If $x = \sec\theta - \cos\theta$, $y = \sec^n\theta - \cos^n\theta$ then $\left(\frac{dy}{dx}\right)^2 = \frac{n^2(y^2+4)}{(x^2+4)}$

1. Only I is true 2. Only II is true
3. Both I and II are true 4. neither I nor II true

11. A : $\frac{d}{dx}\sin^2\left[\cot^{-1}\sqrt{\frac{1+x}{1-x}}\right]$

B : $\frac{d}{dx}\left(\frac{1+\tan x}{1-\tan x}\right) at\ x = 0$

C : For the curve $\sqrt{x} + \sqrt{y} = 1, \frac{dy}{dx}$ at $\left(\frac{1}{4}, \frac{1}{4}\right)$ is

D : $\frac{d}{dx}\left(\tan^{-1}\frac{3x}{1+x^2} + \cot^{-1}\frac{3x}{1+x^2}\right)$

Arrangement of the above values in the increasing order of the magnitude

1. A, B, C, D 2. C, A, D, B
3. C, D, B, A 4. A, D, B, C

12. A : $\frac{d}{dx}\left(\tan^{-1}x + \sin^{-1}\frac{x}{\sqrt{1+x^2}}\right)$ at $x = 0$

B : $\frac{d}{dx}\left(\mathrm{Sec}^{-1}\left(\frac{x^2+\sqrt{x}+1}{x^2-\sqrt{x}-1}\right) + \sin^{-1}\left(\frac{x^2-\sqrt{x}-1}{x^2+\sqrt{x}+1}\right)\right)$

C: $\frac{d}{dx}\left[\tan^{-1}\left(\frac{1+\sin x}{\cos x}\right)\right]$

D: $\frac{d}{dx}\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ at $x = 1$

Arrangement of the above values in the increasing order of the magnitude

1. B, C, D, A 2. B, A, D, C
3. C, D, A, B 4. D, A, B, C

13. A : If $x = ct$, $y = \frac{c}{t}$, $\frac{dy}{dx}$ at t= 1 is

B: $x = 3\cos\theta - \cos^3\theta$, $y = 3\sin\theta - \sin^3\theta$

Then $\frac{dy}{dx}, \theta = \frac{\pi}{3}$ is

C: If $x = a\left(t+\frac{1}{t}\right), y = a\left(t-\frac{1}{t}\right)$ then $\frac{dy}{dx}$ at t=2 is

D : Derivative of log(sec x) with respect to tanx at $x = \frac{\pi}{4}$ is

Arrangement of the above values in the increasing order of the magnitude

1. C, D, A, B 2. C, A, D, B
3. A, B, D, C 4. B, D, A, C

14. A: $\frac{d}{dx}(\sin x)\, at\, x = \frac{\pi}{2}$

B: $\frac{d}{dx}(\tan^{-1}x)$ at $x = 1$

C: $\frac{d}{dx}\left(1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + ...\infty\right) at\ x = 0$

D: $\frac{d}{dx}(x^x)\, at\ x = e$

Arrangement of the above values in the increasing order of the magnitude

1. B, C, A, D 2. D, A, B, C
3. D, B, C, A 4. A, B, C, D

15. If $P(x) = ax^3 + bx^2 + cx + d$ and $p(0) = 4$, $P^1(0) = 3$, $P^{11}(0) = 4$, $P^{111}(0) = 6$ then arrangethe values of a, b, c, d in the descending order of their values

1. a, b, c, d 2. a, b, d, c
3. d, c, b, a 4. b, a, c, d

16. Observe the following lists.

List - I **List - II**

A. $\frac{d}{dx}\left(\sin^{-1}\left(3x-4x^3\right)\right)=$ 1. $\frac{1}{2\sqrt{1-x^2}}$

B. $\frac{d}{dx}\left(\cot^{-1}\sqrt{\frac{1+\cos 3x}{1-\cos 3x}}\right)=$ 2. $\frac{-2}{1+x^2}$

C. $\frac{d}{dx}\left(\tan^{-1}\left(\frac{x}{1+\sqrt{1-x^2}}\right)\right)=$ 3. $\frac{3}{\sqrt{1-x^2}}$

D. $\frac{d}{dx}\sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)=$ 4. $\frac{2}{1+x^2}$

5. $\frac{3}{2}$

The correct match for List - I from List - II is

	A	B	C	D
1.	3	5	2	1
2.	4	3	5	1
3.	3	5	1	2
4.	4	2	5	3

17. Observe the following lists.

List - I **List - II**

A. The derivative of

$\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$ 1. $\frac{1}{1+x^2}$

w.r.to $\tan^{-1}x$

B. $\frac{d}{dx}\left(x\sqrt{x^2-9}-9\cosh^{-1}\left(\frac{x}{3}\right)\right)=$ 2. $\frac{2}{x}$

C. $\frac{d}{dx}\left(\tan^{-1}\left(\frac{2+3x}{3-2x}\right)\right)=$ 3. $2\sqrt{x^2-9}$

D. The derivative of

$\sec^{-1}\left(\frac{1}{2x^2-1}\right)$ w.r.to $\sqrt{1-x^2}$ is 4. $\frac{1}{2}$

5. $\sqrt{x^2-9}$

The correct match for list - 1 from list - II is

	A	B	C	D
1.	5	4	2	3
2.	4	5	3	2
3.	3	4	1	2
4.	4	3	1	2

18. Observe the following lists.

List - I **List - II**

A. If x = a (1-cost); 1. $x^x(1+\log x)$

$y=a(t+\sin t)$ then $\frac{dy}{dx}$

at $x=\frac{\pi}{2}$

B. $\frac{d}{dx}\left(x^x\right)=$ 2. $\frac{a^2}{\left(a^2-x^2\right)^{3/2}}$

C. $\frac{d}{dx}\left(\frac{x}{\sqrt{a^2-x^2}}\right)=$ 3. $\frac{3}{2\sqrt{x}(1+x)}$

D. $\frac{d}{dx}\tan^{-1}\left(\frac{(3-x)\sqrt{x}}{1-3x}\right)=$ 4. 1

5. $\frac{3}{\sqrt{x}(1+x)}$

The correct match for List - I from List - II is

	A	B	C	D
1.	4	1	3	5
2.	3	1	2	4
3.	4	1	2	3
4.	4	1	2	5

19. Observe the following lists.

List - I **List - II**

A. $\frac{d}{dx}\cot^{-1}\left(\frac{\sqrt{1+\sin x}+\sqrt{1-\sin x}}{\sqrt{1+\sin x}-\sqrt{1-\sin x}}\right)=$

1. An odd function

B. Let f(x) be an even

function then $f^1(x)$ is 2. An even function

C. if $f(X+y)=f(x).f(y)$

for all $\forall$ $x, y \in R$, $f(5)=2$,

$f^1(0)=3$, then $f^1(5)=$ 3. 3

D. If $f(x)=e^x\ g(x)$;

$g(0)=2$,

$g^1(0)=1$ then $f^1(0)=$ 4. 6

5. 1/2

The correct match for List - I from List - II is

	A	B	C	D
1.	3	1	5	4
2.	5	1	4	3
3.	4	1	5	3
4.	1	5	4	3

20. Observe the following lists :

List - I	List - II
A. If $\mathrm{Sin}^{-1}x+\sin^{-1}y=\frac{\pi}{2}$ Then $\frac{dy}{dx}$	1. $-\frac{1}{x^2}$
B. $\tan^{-1}x+\tan^{-1}y=\frac{\pi}{2}$ Then $\frac{dy}{dx}$	2. $-\frac{x}{y}$
C. If $x^m y^n=(x+y)^{m+n}$ Then $\frac{dy}{dx}$	3. -1
D. If $\sin(x+y)=\log(x+y)$ Then $\frac{dy}{dx}$	4. $\frac{y}{x}$
	5. $-\frac{y}{x}$

The correct match is

	A	B	C	D
1.	2	1	3	4
2.	2	1	4	3
3.	1	2	3	4
4.	2	1	3	5

KEY

1.3	**2.1**	**3.1**	**4.2**	**5.2**
6.1	**7.2**	**8.3**	**9.2**	**10.2**
11.2	**12.1**	**13.3**	**14.4**	**15.3**
16.3	**17.4**	**18.3**	**19.2**	**20.2**

LEVEL - V

Q1. If x and y are functions in θ then

$$\frac{dy}{dx}=\frac{dy}{d\theta}/\frac{dx}{d\theta}$$

(i) If $x=a\cos\theta$, $y=b\sin\theta$ then $\frac{dy}{dx}=$

1. $\frac{b}{a}\tan\theta$ 2. $-\frac{b}{a}\cot\theta$

3. $\frac{b}{a}\cot\theta$ 4. $-\frac{b}{a}\tan\theta$

(ii) If $x=a(\cos\theta+\theta\sin\theta)$,

$y=a(\sin\theta-\theta\cos\theta)$ then $\frac{dy}{dx}=$

1. $\tan\theta$ 2. $\cot\theta$

3. $\cot\frac{\theta}{2}$ 4. $\tan\frac{\theta}{2}$

Q2. If f(x, y) = c is an implicit function then

$$\frac{dy}{dx}=\frac{-\left(\frac{\partial f}{\partial x}\right)}{\left(\frac{\partial f}{\partial y}\right)}$$

(i) If $x^2+y^2+3xy=7$ then $\frac{dy}{dx}=$

1. $\frac{2x+3y}{3x+2y}$ 2. $\frac{-(2x+3y)}{(3x+2y)}$

3. $\frac{2x-3y}{2y-3x}$ 4. $\frac{3x+2y}{2x+3y}$

(ii) If $ax^2+2hxy+by^2+2gx+2fy+c=0$ then $\frac{dy}{dx}=$

1. $\frac{ax+hy}{hx+by}$ 2. $\frac{-(ax+hy)}{(hx+by)}$

3. $\frac{ax+hy+g}{hx+by+f}$ 4. $-\left(\frac{ax+hy+g}{hx+by+f}\right)$

KEY

Q1. (i). 2 (ii). 1
Q2. (i). 2 (ii). 4

PREVIOUS EAMCET QUESTIONS

2005

1. $x\sqrt{1+y}+y\sqrt{1+x}=0\Rightarrow\frac{dy}{dx}=$

1. $\frac{-1}{(1-x)^2}$ 2. $\frac{-1}{(1+x)^2}$

3. $\frac{1}{(1+x^2)}$ 4. $\frac{1}{(1-x^2)}$

2. If $f:R\to R$ defined by $f(x)=\frac{(x-2)}{(x^2-3x+2)}$

if $x\in R-\{1,2\}$

= 2 if x = 1

= 1 if x = 2

Then $\underset{x\to 2}{Lt}\frac{f(x)-f(2)}{x-2}=$

1. 0 2. -1 3. 1 4. 1/2

2004

3. If $f:R\to R$ is an even function having derivatives of all orders, then an odd function among the following is

1. f^{11} 2. f^{111}

3. $f^{1}+f^{11}$ 4. $f^{11}+f^{111}$

4. $x>0, x^y=e^{x-y}\Rightarrow\frac{dy}{dx}=$........

1. $\frac{1}{(1+\log x)^2}$ 2. $\frac{\log x}{(1+\log x)^2}$

3. $\left(\frac{\log x}{1+\log x}\right)^2$ 4. $\frac{(\log x)^2}{1+\log x}$

2003

5. If $f(x)=\frac{x}{1+|x|}$ for $x\in R$ then $f^1(0)=$

1. 0 2. 1 3. 2 4. 3

6. If $f(x)=\frac{x-1}{(2x^2-7x+5)}$ for $x\neq 1$ = $\frac{-1}{3}$]

for x = 1 Then $f^1(1)=$

1. $\frac{-1}{9}$ 2. $\frac{-2}{9}$ 3. $\frac{-1}{3}$ 4. $\frac{1}{3}$

2002

7. Let f(x)=e^x; g(x)=$Sin^{-1}x$ and h(x)=f(g(x)) then $\frac{h^1(x)}{h(x)}=$

1) $Sin^{-1}x$ 2) $\frac{1}{\sqrt{1-x^2}}$ 3) $\frac{1}{1-x^2}$ 4) $e^{Sin^{-1}x}$

8. If f(x)= $\sqrt{ax}+\frac{a^2}{\sqrt{ax}}$ then $f^1(a)$=

1) a 2) 0 3) 1 4) -1

2001

9. If h(x) = e^{e^x} then $\frac{h^1(x)}{h(x)}=$

1) h(x) 2) $\frac{1}{h(x)}$ 3) logh(x) 4) -logh(x)

10. $\frac{d}{dx}\left\{Sin^{-1}\left(\frac{3x}{2}-\frac{x^3}{2}\right)\right\}=$

1) $\frac{3}{\sqrt{4-x^2}}$ 2) $\frac{-3}{\sqrt{4-x^2}}$

3) $\frac{1}{\sqrt{4-x^2}}$ 4) $\frac{-1}{\sqrt{4-x^2}}$

2000

11. If $y=2^{2^x}$ then $\frac{dy}{dx}=$

1) $y\left(\log_{10}^{2}\right)^2$ 2) $y\left(\log_{e}^{2}\right)^2$

3) $y.2^x\left(\log_e^2\right)^2$ 4) $y\log_2^e$

12. $\frac{d}{dx}\left\{\cos^{-1}\left(\frac{4x^3}{27}-x\right)\right\}=$

1) $\frac{3}{\sqrt{9-x^2}}$ 2) $\frac{1}{\sqrt{9-x^2}}$

3) $\frac{-3}{\sqrt{9-x^2}}$ 4) $\frac{-1}{\sqrt{9-x^2}}$

13. If xy=$(x+y)^n$ and $\frac{dy}{dx}=\frac{y}{x}$ then n=

1)1 2)2 3)3 4)4

1999

14. $\frac{d}{dx}\left\{\cos^{-1}x+Sin^{-1}\sqrt{1-x^2}\right\}=$

1)0 2)1 3) $\frac{2}{\sqrt{1-x^2}}$ 4) $\frac{-2}{\sqrt{1-x^2}}$

15. Derivative of $Sin^{-1}x$ with respect to $Cos^{-1}\sqrt{1-x^2}$

1) $\frac{1}{\sqrt{1-x^2}}$ 2) $Cos^{-1}x$ 3) 1 4) 0

16. $x=\theta-\frac{1}{\theta}$ and $y=\theta+\frac{1}{\theta}$ find $\frac{dy}{dx}$

1) $\frac{x}{y}$ 2) $\frac{y}{x}$ 3) $\frac{-x}{y}$ 4) $\frac{-y}{x}$

17. If $y = x^x$ find $\frac{dy}{dx} = -----$

1) x^x
2) $x^x \log x$
3) $x^x(1+\log x)$
4) $\frac{x^x}{\log x}$

18. If $y = \mathrm{Cot}^{-1}\left[\mathrm{Tan}\left(\frac{\pi}{2} - x\right)\right]$ then $\frac{dy}{dx} = ------$

1)x 2)1 3) $\frac{1}{1+x^2}$ 4) $\frac{-1}{1+x^2}$

1998

19. $\frac{d}{dx}\left(Cosx^0\right) =$

1) $-Sinx^0$
2) $\frac{-\pi}{180} Sinx^0$
3) $\frac{\pi}{180} Sinx^0$
4) $\frac{2\pi}{180} Sinx^0$

20. $\frac{d}{dx}\left(x^x\right) =$

1) $x^x \log(ex)$
2) $x^x \log(x)$
3) $x^x \log_x^e$
4) $x^x \log_x^x$

21. The derivative of Sin²x with respect to $(\log x)^2$ is

1) $\frac{x \sin x \cos x}{\log x}$
2) $\frac{2x \sin x \cos x}{(\log x)^2}$
3) $\frac{\sin^2 x}{2\log_x}$
4) $x \log x$

22. If f(x)= $\begin{vmatrix} 2\mathrm{Cos}x & 1 & 0 \\ x - \frac{\pi}{2} & 2\mathrm{Cos}x & 1 \\ 0 & 1 & 2\mathrm{Cos}x \end{vmatrix}$ then $\frac{df}{dx}$ at $x = \frac{\pi}{2}$ is

1)2 2) $\frac{\pi}{2}$ 3)1 4)8

1997

23. If $e^{x-y} = x^y$ then $\frac{dy}{dx} =$

1) $\frac{\log x}{(1-\log x)^2}$
2) $\frac{1-x}{y + x\log y}$
3) $\frac{x-y}{x\log(ex)}$
4) $\frac{-\log x}{(1+\log x)^2}$

24. $\frac{d}{dx}\left\{Cos^{-1}\left(\frac{4x^3}{27} - x\right)\right\} =$

1) $\frac{3}{\sqrt{9-x^2}}$
2) $\frac{1}{\sqrt{9-x^2}}$
3) $\frac{-3}{\sqrt{9-x^2}}$
4) $\frac{-1}{\sqrt{9-x^2}}$

25. Derivative of an odd function is an

1)Even Function 2)Odd Function
3)Even and odd function 4)None

26. If tany $= \frac{2t}{1-t^2}, Sinx = \frac{2t}{1+t^2}$ then $\frac{dy}{dx} =$

1)0 2) $Cos\ x$ 3)tan x 4)1

1996

27. $\frac{d}{dx}\left\{\mathrm{Sin}^2 \cot^{-1}\sqrt{\frac{1+x}{1-x}}\right\} =$

1)0 2) $\frac{1}{2}$ 3) $-\frac{1}{2}$ 4) -1

28. $\frac{d}{dx}\left\{Sin^{-1}\left(\frac{3x}{2} - \frac{x^3}{2}\right)\right\} =$

1) $\frac{3}{\sqrt{4-x^2}}$
2) $\frac{-3}{\sqrt{4-x^2}}$
3) $\frac{1}{\sqrt{4-x^2}}$
4) $\frac{-1}{\sqrt{4-x^2}}$

29. If ySinx = x + y then $\left(\frac{dy}{dx}\right)_{x=0}$

1)-1 2)1 3)2 4)2

30. If $y = 2^{ax}$ and $\frac{dy}{dx} = \log 256$ at x=1, then the value of a is

1)0 2)1 3)2 4)3

31 If $y = \sqrt{\tan x + \sqrt{\tan x + \sqrt{\tan x + ...to\ \infty}}}$ then $\frac{dy}{dx} =$

1) $\frac{\cos^2 x}{(2y-1)}$ 2) $\frac{\sec^2 x}{(2y-1)}$ 3) $\frac{\tan x}{(2y-1)}$ 4) $\frac{Cotx}{(2y-1)}$

32. If $x^y = \log x$, then the value of $\frac{dy}{dx}$ at x=e is

1)0 2)1 3)e 4) $\frac{1}{e}$

1995

33. The derivative of $Cos^{-1}(2x^2-1)$ with respect to $Cos^{-1}x$ is

1) 2   2) $\frac{2}{x}$

3) $\frac{1}{2\sqrt{1-x^2}}$ 4) $\sqrt{1-x^2}$

34. If Siny = x Sin $(\alpha + y)$, then $\frac{dy}{dx} =$

1) $\frac{Sin\alpha}{Sin^2(\alpha+y)}$ 2) $\frac{Sin^2(\alpha+y)}{Sin\alpha}$

3) $Sin\alpha.Sin^2(\alpha+y)$ 4) $\frac{Sin^2(\alpha-y)}{Sin\alpha}$

35. if f(x) $\left\{\begin{matrix} =\frac{\tan x}{x}, & x\neq 0 \\ =1 & x=0 \end{matrix}\right\}$ the function at x=0 is

1) differentiable   2) continuous
3) discontinuous   4) None

36. If $\sqrt{\tan y} = e^{\cos 2x}.Sinx$, then $\frac{dy}{dx} =$

1) $Sin2y.(Cotx - 2Sin2x)$
2) $Sin2x(\cot y - \sin y)$
3) Sin2y.Sin2x   4) cos2y.cos2x

1994

37. If 3 Sin xy +4Cos x y =5, then $\frac{dy}{dx} =$

1) $-\frac{y}{x}$ 2) $\frac{3\sin xy + 4\cos xy}{3\cos xy - 4\cos xy}$

3) $\frac{3\cos xy + 4\sin xy}{4\cos xy - 3Sin\,xy}$ 4None

38. Consider f(x) $= \frac{x^2}{|x|}, x\neq 0, f(x)=0, x=0$

1) f(x) is discontinuous every where
2) f(x) is continuous every where
3) f(x) is not defined   4) None

1993

39. If $y = x^{\sin x} + (\sin x)^x$ then $\frac{dy}{dx} =$

1) $x^{\sin x}\left\{\frac{\sin x}{x} + \cos x.\log x\right\} + (Sin x)^x\{x\cot x + \log(\sin x)\}$

2) $x^{\sin x}\left\{\frac{x}{\sin x} + \cos x.\log x\right\} + (Sin x)^x\{x\cot x - \log(\sin x)\}$

3) $x^{\sin x}\{x\cos ecx - \cos x.\log x\} + (Sin x)^x\{x\cot x + \log(\cos x)\}$

4) $x^{\sin x}\{x\cos ecx - \cos x.\log x\} - (Sin x)^x\{x\cot x + \log(\cos x)\}$

1992

40. If $x = \cos^3\theta, y = \sin^3\theta$ then $\sqrt{1+\left(\frac{dy}{dx}\right)^2} =$

1) $\tan^2\theta$ 2) $Sec^2\theta$ 3) $Sec\theta$ 4) $|Sec\theta|$

41. If the function of f is defined by f(x) $= \frac{x}{1+|x|}$ then at what points is f differentiable

1) Every where   2) at x = $\pm$ 1
3) Except at x=0   4) Except at x=0 or $\pm$ 1

1991

42. The derivative of $Sec^{-1}\frac{1}{2x^2-1}$ with respect to $\sqrt{1+3x}$ at x= $-\frac{1}{3}$

1) 0   2) $\frac{1}{2}$ 3) $\frac{1}{4}$ 4) $\frac{1}{8}$

43. If $y = Sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ then $\frac{dy}{dx} =$

1) $\frac{-2}{1+x^2}$ 2) $\frac{2}{1+x^2}$ 3) $\frac{1}{2+x^2}$ 4) $\frac{2}{2-x^2}$

1989

44. The derivative of Sec $\left(a^x + x^a\right)^2$ ......

.

1988

45. The derivative of $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ with respect to $Tan^{-1}\frac{2x}{1-x^2}$ is

1) 1   2) $\frac{1}{3}$ 3) 0   4) $-\frac{1}{2}$

1987

46. The derivative of $\log_{10}x$ with respect to x^2 is

1) $\frac{1}{2x^2\log 10}$ 2) $2x^2\log 10$

3) $-\frac{1}{x^2\log 10}$ 4) None

1986

47. $\frac{d}{dx}\left[Sec^{-1}\frac{1}{\sqrt{1-x^2}} + \cot^{-1}\frac{\sqrt{1-x^2}}{x}\right]$

1) $\frac{2}{1-x^2}$ 2) $\frac{2}{\sqrt{1-x^2}}$ 3) $\frac{1}{\sqrt{1-x^2}}$ 4) 0

1985

48. If $y = Sin^{-1}\left(\frac{2x}{1-x^2}\right)$ and z= $Sin^{-1}\left(\frac{x}{1+x^2}\right)$ then $\frac{dy}{dz} =$

1) $\frac{3(\log x)^2}{x}$ 2) $3(\log x)^2$ 3) $\frac{(\log x)^2}{x}$ 4) None

49. If $y = (\log x)^3$ then $\frac{dy}{dx}$ =

1) $\frac{3(\log x)^2}{x}$ 2) $3(\log x)^2$

3) $\frac{(\log x)^2}{x}$ 4) None

1983

50. The derivative of x^x

1) $x^2 \log x$ 2) $x^x \log x$

3) $x^x \log(ex)$ 4) None

51. $\frac{d}{dx}\left[\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right)\right] =$

1) $-\frac{1}{2}$ 2) $\frac{1}{2}$ 3) $\frac{1}{3}$ 4) 1

1982

52. $\frac{d}{dx}\left[\tan^{-1}(\sec x + \tan x)\right] =$

1) 0 2) $\sec x + \tan x$

3) $\frac{1}{2}$ 4) 2

53. $\frac{d}{dx}\left[e^{\log\sqrt{1+\tan^2 x}}\right] =$

1) $\tan^2 x$ 2) $\sec x \tan x$

3) $\sec^2 x \tan x$ 4) None

54. $\frac{d}{dx}\left(x^2 \sin x^2\right) =$

1) $4x \sin x \cos x$

2) $2x \sin x(\sin x + x\cos x)$

3) $2x\sin^2 x + x^2\cos^2 x$

4) None

1981

55. $x^y = y^x \Rightarrow x(x - y\log x)\frac{dy}{dx} =$ [2006]

1) $y(y - x\log y)$ 2) $y(y + x\log y)$

3) $x(x + y\log x)$ 4) $x(y - x\log y)$

56. $\frac{d}{dx}\left[\cos^{-1}\sqrt{1-x^2}\right] =$

1) $\frac{1}{\sqrt{1-x^2}}$ 2) $\frac{2}{\sqrt{1-x^2}}$ 3) $-\frac{1}{\sqrt{1-x^2}}$ 4) -1

57. If $2x^2 - 3xy + y^2 + x + 2y - 8 = 0$ then $\frac{dy}{dx} =$ **[2007]**

1) $\frac{3y-4x-1}{2y-3x+2}$ 2) $\frac{3y+4x-1}{2y+3x+2}$

3) $\frac{3y-4x+1}{2y-3x-2}$ 4) $\frac{3y-4x+1}{2y+3x+2}$

58. If $y - \log\left\{\left(\frac{1+x}{1-x}\right)^{\frac{1}{4}}\right\} - \frac{1}{2}\tan^{-1}(x)$, then $\frac{dy}{dx} =$ **[2007]**

1) $\frac{x}{1-x^2}$ 2) $\frac{x^2}{1-x^4}$

3) $\frac{x}{1+x^4}$ 4) $\frac{x}{1-x^4}$

59. $x = \cos\theta, y = \sin 5\theta \Rightarrow$

$(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} =$ **[2007]**

1) -5y 2) 5y 3) 25y 4) -25y

KEY

1.2	2.2	3.2	4.2	5.2
6.2	7. 2	8. 2	9. 3	10. 1
11. 3	12. 3	13. 2	14. 4	15. 3
16. 1	17. 3	18. 2	19. 2	20. 1
21. 1	22. 1	23. 3	24. 3	25. 1
26. 4	27. 3	28. 1	29. 2	30. 3
31. 2	32. 4	33. 1	34. 2	35. 2
36. 1	37. 1	38. 2	39. 1	40. 4
41.1	42. 1	43. 1		

44 $\sec(a^x+x^a)^2 \tan(a^x+x^a)^2 2(a^x+x^a)(a^x \log a + ax^{a-1})$

45. 1	46. 1	47. 2	48 4	49. 1
50. 3	51. 1	52. 3	53. 2	54. 4
55.1	56.1	57. 1	58. 2	59. 4