

## ASSIGNMENT CLASS XII INDEFINITE INTEGRALS

Evaluate the following Integrals:

1.  $e^{x \log a} + e^{a \log x} + e^{a \log a}$

2.  $\frac{1}{1 + \cos x}$

3.  $\frac{\sin x}{1 + \sin x}$

4.  $\tan^{-1}(\sec x + \tan x)$

5.  $\frac{\sin^6 x + \cos^6 x}{\sin^2 x \cos^2 x}$

6.  $\tan^{-1} \sqrt{\frac{1 - \sin x}{1 + \sin x}}$

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

8.  $\frac{x^3}{x+2}$

9.  $\sin^3 x \cos^3 x$

10.  $\cos^4 x$

11.  $\cos 2x \cos 4x$

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

13.  $\sin 4x \cos 7x$

14.  $\frac{1 + \cos x}{1 - \cos x}$

15.  $\frac{e^x - e^{-x}}{e^x + e^{-x}}$

16.  $\frac{\sin 2x}{a^2 \sin^2 x + b^2 \cos^2 x}$

17.  $\frac{\sin x}{\sin(x-a)}$

18.  $\frac{1}{\sin(x-a) \sin(x-b)}$

19.  $\frac{1 - \cot x}{1 + \cot x}$

20.  $\frac{1}{e^x + 1}$

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

22.  $\frac{\sin 2x}{(a+b \cos x)^2}$

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

24.  $\sin^2 x \cos^5 x$

25.  $\sin^7 x$

26.  $\tan^3 x$

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

28.  $\frac{\cos^5 x}{\sin x}$

29.  $\frac{1}{\sqrt{9-25x^2}}$

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

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

32.  $\frac{1}{x^2+8x+20}$

33.  $\frac{e^x}{e^{2x}+6e^x+5}$

34.  $\frac{1}{x(x^n+1)}$

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

36.  $\frac{1}{\sqrt{9+8x-x^2}}$

37.  $\frac{1}{\sqrt{16-6x-x^2}}$

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

39.  $\frac{2x-3}{x^2+3x-18}$

40.  $\frac{2 \sin 2\phi - \cos \phi}{6 - \cos^2 \phi - 4 \sin \phi}$

41.  $\frac{x+2}{2x^2+6x+5}$

42.  $\frac{x^2}{x^2+6x+12}$

43.  $\sqrt{\frac{a-x}{a+x}}$

44.  $\frac{3x+1}{\sqrt{5-2x-x^2}}$

45.  $\frac{1}{a^2 \sin^2 x + b^2 \cos^2 x}$

46.  $\frac{\sin x}{\sin 3x}$

47.  $\frac{1}{2-3 \cos 2x}$

48.  $\frac{\sin 2x}{\sin^4 x + \cos^4 x}$

49.  $\frac{1}{1-2 \sin x}$

50.  $\frac{1}{5+4 \cos x}$

51.  $\frac{1}{3+2 \sin x + \cos x}$

52.  $\frac{3 \sin x + 2 \cos x}{3 \cos x + 2 \sin x}$

53.  $(\log x)^2$

54.  $\sin^{-1} x$

55.  $\frac{x - \sin x}{1 - \cos x}$

56.  $\sec^3 x$

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

58.  $x^2 \tan^{-1} x$

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

60.  $\frac{\sin^{-1} x}{x^2}$

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

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

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

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

65.  $e^{ax} \cos bx$

66.  $\sqrt{7x-10-x^2}$

67.  $\frac{\sqrt{16+(\log x)^2}}{x}$

68.  $(3x-2)\sqrt{x^2+x+1}$

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

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

71.  $\frac{1}{\sin x - \sin 2x}$

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

73.  $\frac{8}{(x+2)(x^2+4)}$

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

75.  $\frac{\tan \theta + \tan^3 \theta}{1 + \tan^3 \theta}$

76.  $\frac{\sin 2x}{(1+\sin x)(2+\sin x)}$

77.  $\frac{1}{x(x^5+1)}$

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

79.  $\frac{x^2+4}{x^4+16}$

80.  $\frac{1}{x^4+1}$

81.  $\sqrt{\tan x}$

82.  $\sqrt{\cot x}$

83.  $\frac{1}{\sin^4 x + \cos^4 x}$

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

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

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

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

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

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

90.  $\frac{\sin(x-\alpha)}{\sin(x+\alpha)}$

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

92.  $\frac{1-\tan x}{x+\log(\cos x)}$

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

94.  $\frac{e^x}{\sqrt{5-4e^x-e^{2x}}}$

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

96.  $\sqrt{1+2\tan x}(\sec x + \tan x)$

97.  $e^{\sqrt{x}} \frac{\cos e^{\sqrt{x}}}{\sqrt{x}}$

98.  $\cos(\log x)$

99.  $\frac{2\sin 2\theta - \cos \theta}{6 - \cos^2 \theta - 4\sin \theta}$

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

**ANSWERS (INDEFINITE INTEGRALS)** ( add a constant  $c$  to every answer)

1.  $\frac{a^x}{\log a} + \frac{x^{a+1}}{a+1} + a^x$       2.  $\tan\left(\frac{x}{2}\right)$       3.  $x + \sec x - \tan x$       4.  $\frac{\pi x}{4} + \frac{x^2}{4}$       5.  $\tan x - \cot x - 3x$

6.  $\frac{\pi x}{4} - \frac{x^2}{4}$       7.  $\frac{2}{27}\{(3x+4)^{3/2} + (3x+1)^{3/2}\}$       8.  $\frac{x^3}{3} - x^2 + 4x - 8\log|x+2|$       9.  $\frac{1}{32}\left[\frac{-3}{2}\cos 2x + \frac{1}{6}\cos 6x\right]$

10.  $\frac{1}{8}\left[3x + 2\sin 2x + \frac{\sin 4x}{4}\right]$       11.  $\frac{1}{2}\left[\frac{\sin 6x}{6} + \frac{\sin 2x}{2}\right]$       12.  $\frac{x^3}{3} - x + 4\tan^{-1}x$       13.  $\frac{-1}{22}\cos 11x + \frac{1}{6}\cos 3x$

14.  $-2\cot\frac{x}{2} - x$       15.  $\log|e^x + e^{-x}|$       16.  $\frac{1}{(a^2 - b^2)}\log|a^2 \sin^2 x + b^2 \cos^2 x|$

17.  $\sin a \log|\sin(x-a)| + (x-a)\cos a$       18.  $\operatorname{cosec}(a-b) \cdot \log\left|\frac{\sin(x-a)}{\sin(x-b)}\right|$       19.  $-\log|\cos x + \sin x|$

20.  $-\log|1 + e^{-x}|$       21.  $2\log|\sqrt{x} + 1|$       22.  $\frac{-2}{b^2}\left[\log|a + b\cos x| + \frac{a}{a + b\cos x}\right]$       23.  $\frac{1}{2}\tan(2\tan^{-1}x)$

24.  $\frac{\sin^3 x}{3} - \frac{2\sin^5 x}{5} + \frac{\sin^7 x}{7}$       25.  $-\cos x + \cos^3 x - \frac{3\cos^5 x}{5} + \frac{1}{7}\cos^7 x$       26.  $\frac{1}{2}\tan^2 x - \log|\sec x|$

27.  $\frac{1}{3}(x + \log x)^3$       28.  $\frac{1}{4}\sin^4 x - \sin^2 x + \log|\sin x|$       29.  $\frac{1}{5}\sin^{-1}\left(\frac{5x}{3}\right)$       30.  $\frac{x^3}{3} - x + 2\tan^{-1}x$

31.  $\frac{1}{4}\log\left|\frac{x+1}{3-x}\right|$       32.  $\frac{1}{2}\tan^{-1}\left(\frac{x+4}{2}\right)$       33.  $\frac{1}{4}\log\left|\frac{e^x+1}{e^x+5}\right|$       34.  $\frac{1}{n}\log\left|\frac{x^n}{x^n+1}\right|$       35.  $\frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{2x^2-1}{\sqrt{3}}\right)$

36.  $\sin^{-1}\left(\frac{x-4}{5}\right)$       37.  $\sin^{-1}\left(\frac{x+3}{5}\right)$       38.  $\sin^{-1}\left(\frac{2x^2+1}{\sqrt{5}}\right)$       39.  $\log|x^2+3x-18| - \frac{2}{3}\log\left|\frac{x-3}{x+6}\right|$

40.  $2\log|\sin^2\phi - 4\sin\phi + 5| + 7\tan^{-1}(\sin\phi - 2)$       41.  $\frac{1}{4}\log|2x^2+6x+5| + \frac{1}{2}\tan^{-1}(2x+3)$

42.  $x - 3\log|x^2+6x+12| + 2\sqrt{3}\tan^{-1}\left(\frac{x+3}{\sqrt{3}}\right)$       43.  $a\sin^{-1}\left(\frac{x}{a}\right) + \sqrt{a^2-x^2}$       44.  $-3\sqrt{5-2x-x^2} - 2\sin^{-1}\left(\frac{x+1}{\sqrt{6}}\right)$

45.  $\frac{1}{ab}\tan^{-1}\left(\frac{a\tan x}{b}\right)$       46.  $\frac{1}{2\sqrt{3}}\log\left|\frac{\sqrt{3}+\tan x}{\sqrt{3}-\tan x}\right|$       47.  $\frac{1}{2\sqrt{5}}\log\left|\frac{\sqrt{5}\tan x-1}{\sqrt{5}\tan x+1}\right|$       48.  $\tan^{-1}(\tan^2 x)$

49.  $\frac{1}{\sqrt{3}}\log\left|\frac{\tan(x/2)-2-\sqrt{3}}{\tan(x/2)-2+\sqrt{3}}\right|$       50.  $\frac{2}{3}\tan^{-1}\left(\frac{\tan x/2}{3}\right)$       51.  $\tan^{-1}\left(1 + \tan\frac{x}{2}\right)$

52.  $\frac{-5x}{13} + \frac{12}{13}\log|3\cos x + 2\sin x|$       53.  $x(\log x)^2 - 2(x\log x - x)$       54.  $x\sin^{-1}x + \sqrt{1-x^2}$

55.  $-x \cot \frac{x}{2}$       56.  $\frac{1}{2} \sec x \tan x + \frac{1}{2} \log |\sec x + \tan x|$       57.  $\frac{x}{\sqrt{1-x^2}} \sin^{-1} x + \frac{1}{2} \log |1-x^2|$

58.  $\frac{x^3}{3} \tan^{-1} x - \frac{1}{6} x^2 + \frac{1}{6} \log |x^2 + 1|$       59.  $2x \tan^{-1} x - \log |1+x^2|$       60.  $-\frac{\sin^{-1} x}{x} + \log \left| \frac{1-\sqrt{1-x^2}}{x} \right|$

61.  $-e^x \cot \frac{x}{2}$       62.  $\frac{x}{(\log x + 1)}$       63.  $\frac{e^x}{1-x}$       64.  $\frac{x}{\log x}$       65.  $\frac{e^{ax}}{a^2 + b^2} (a \cos bx + b \sin bx)$

66.  $\frac{1}{4} (2x-7) \sqrt{7x-10-x^2} + \frac{9}{8} \sin^{-1} \left( \frac{2x-7}{3} \right)$       67.  $\frac{1}{2} \log x \sqrt{(\log x)^2 + 16} + 8 \log \left| \log x + \sqrt{(\log x)^2 + 16} \right|$

68.  $(x^2 + x + 1)^{3/2} - \frac{7}{2} \left[ \left( x + \frac{1}{2} \right) \sqrt{x^2 + x + 1} + \frac{3}{8} \log \left| x + \frac{1}{2} + \sqrt{x^2 + x + 1} \right| \right]$       69.  $-\frac{1}{3} (1-x-x^2)^{3/2} + \frac{1}{8} (2x+1) \sqrt{1-x-x^2} + \frac{5}{16} \sin^{-1} \left( \frac{2x+1}{\sqrt{5}} \right)$

70.  $-\frac{1}{6} \log |x-1| |1 + \cos x| - \frac{1}{3} \log |x+2| + \frac{1}{2} \log |x-3|$       71.  $-\frac{1}{2} \log |1 - \cos x| - \frac{1}{6} \log |1 + \cos x| + \frac{2}{3} \log |1 - 2 \cos x|$

72.  $\frac{5}{16} \log |x-2| - \frac{7}{4(x-2)} - \frac{5}{16} \log |x+2|$       73.  $\log |x+2| - \frac{1}{2} \log |x^2 + 4| + \tan^{-1} \frac{x}{2}$       74.  $-\frac{1}{3} \tan^{-1} x + \frac{2}{3} \tan^{-1} \left( \frac{x}{2} \right)$

75.  $-\frac{1}{3} \log |1 + \tan \theta| + \frac{1}{6} \log |\tan^2 \theta - \tan \theta + 1| + \frac{1}{\sqrt{3}} \tan^{-1} \left( \frac{2 \tan \theta - 1}{\sqrt{3}} \right)$       76.  $\log \left| \frac{(2 + \sin x)^4}{(1 + \sin x)^2} \right|$

77.  $\frac{1}{5} \log \left| \frac{x^5}{x^5 + 1} \right|$       78.  $\frac{1}{2} \log \left| \frac{x^2 - x + 1}{x^2 + x + 1} \right|$       79.  $\frac{1}{2\sqrt{2}} \tan^{-1} \left( \frac{x^2 - 4}{2\sqrt{2}x} \right)$       80.  $\frac{1}{2\sqrt{2}} \tan^{-1} \left( \frac{x^2 - 1}{\sqrt{2}x} \right) - \frac{1}{4\sqrt{2}} \log \left| \frac{x^2 - \sqrt{2}x + 1}{x^2 + \sqrt{2}x + 1} \right|$

81.  $\frac{1}{\sqrt{2}} \tan^{-1} \left( \frac{\tan \theta - 1}{\sqrt{2} \tan \theta} \right) + \frac{1}{2\sqrt{2}} \log \left| \frac{\tan \theta - \sqrt{2} \tan \theta + 1}{\tan \theta + \sqrt{2} \tan \theta + 1} \right|$       82.  $-\frac{1}{\sqrt{2}} \tan^{-1} \left( \frac{\cot \theta - 1}{\sqrt{2} \cot \theta} \right) - \frac{1}{2\sqrt{2}} \log \left| \frac{\cot \theta - \sqrt{2} \cot \theta + 1}{\cot \theta + \sqrt{2} \cot \theta + 1} \right|$

83.  $\frac{1}{\sqrt{2}} \tan^{-1} \left( \frac{\tan^2 x - 1}{\sqrt{2} \tan x} \right)$       84.  $\frac{1}{2\sqrt{2}} \log \left| \frac{x^2 - \sqrt{2}x + 1}{x^2 + \sqrt{2}x + 1} \right|$       85.  $2 \left[ \sqrt{x} - \tan^{-1} \sqrt{x} \right]$       86.  $\frac{1}{4\sqrt{3}} \log \left| \frac{\sqrt{x+1} - \sqrt{3}}{\sqrt{x+1} + \sqrt{3}} \right| - \frac{1}{2} \tan^{-1} (\sqrt{x+1})$

87.  $\sqrt{\frac{x-1}{x+1}}$       88.  $-\frac{\sqrt{1+x^2}}{x}$       89.  $\frac{1}{4} \log (x^2 + 1) + \frac{1}{2} \tan^{-1} x - \frac{1}{2} \log |x+1|$       90.  $(x + \alpha) \cos 2\alpha - \sin 2\alpha \cdot \log |\sin (x + \alpha)|$

91.  $\frac{e^x}{x+2}$       92.  $\log |x + \log (\cos x)|$       93.  $\sqrt{x^2 + a^2} - a \log \left( \frac{a + \sqrt{x^2 + a^2}}{x} \right)$       94.  $\sin^{-1} \left( \frac{e^x + 2}{3} \right)$

95.  $(x+1) - 2 \log |x+1| - \frac{2}{x+1}$       96.  $\log |\sec^2 x + \sec x \tan x|$       97.  $2 \sin (e^{\sqrt{x}})$

98.  $\frac{x}{2} [\sin (\log x) + \cos (\log x)]$       99.  $2 \log |\sin^2 \theta - 4 \sin \theta + 5| + 7 \tan^{-1} (\sin \theta - 2)$       100.  $\frac{x^2}{2}$