CLASS 12
MATHEMATICS WORKSHEET
(SC Form) (2013)(BKC/ANC/CSG)
Integral Calculus : Integration (i)

- **Evaluate the following integrals.**

1. $\int x^6 dx$ $\left[Ans: \frac{x^7}{7}+c\right]$
2. $\int 5x^4 dx$ $\left[Ans: x^5+c\right]$
3. $\int \frac{\left(\sqrt{x}+\sqrt[3]{x^2}\right)}{x}dx$ $\left[Ans: x+\frac{12}{7}x^{\frac{7}{6}}+\frac{3}{4}x^{\frac{4}{3}}+c\right]$
4. $\int \frac{3x^4+7x-11}{x^3}dx$ $\left[Ans: \frac{3}{2}x^2-\frac{7}{x}+\frac{11}{2x^2}+c\right]$
5. $\int \left(\sqrt{x}-\frac{1}{\sqrt{x}}\right)^3 dx$ $\left[Ans: \frac{2}{5}x^{\frac{5}{2}}-2x^{\frac{3}{2}}+6\sqrt{x}+\frac{2}{\sqrt{x}}+c\right]$
6. $\int \frac{a+b\sin x}{\cos^2 x}dx$ $\left[Ans: a\tan x+b\sec x+c\right]$
7. $\int \operatorname{cosec} x\left(\operatorname{cosec} x-\cot x\right)dx$ $\left[Ans: \operatorname{cosec} x-\cot x+c\right]$
8. $\int \left(\frac{2\cos x}{5\sin^2 x}+\frac{1}{5\cos^2 x}\right)dx$ $\left[Ans: -\frac{2}{5\cos ecx}+\frac{1}{5}\tan x+c\right]$
9. $\int \frac{\sin^2 x-\cos^2 x}{\sin^2 x\cos^2 x}dx$ $\left[Ans: \tan x+\cot x+c\right]$
10. $\int \frac{dx}{(3-8x)^5}$ $\left[Ans: \frac{1}{32}(3-8x)^{-4}+c\right]$
11. $\int \frac{dx}{\sqrt{ax+b}-\sqrt{ax+c}}$ $\left[Ans: \frac{2}{3a(b-c)}\left\{(ax+b)^{\frac{3}{2}}+(ax+c)^{\frac{3}{2}}\right\}+c\right]$
12. $\int \sin^2 x dx$ $\left[Ans: \frac{1}{2}x-\frac{1}{4}\sin 2x+c\right]$

13. $\int \cos^2 mx dx$

$\left[Ans: \frac{x}{2}+\frac{\sin 2mx}{4m}+c\right]$

14. $\int \cos^3 x dx$ $\left[Ans: \frac{3}{4}\sin x+\frac{1}{12}\sin 3x+c\right]$

15. $\int \sin^4 x dx$ $\left[Ans: \frac{3}{8}x-\frac{1}{4}\sin 2x+\frac{1}{32}\sin 3x+c\right]$

16. $\int \sin^2 x\cos^2 x dx$ $\left[Ans: \frac{1}{8}-\frac{1}{32}\sin 4x+c\right]$

17. $\int \sin^3 x\cos^3 x dx$ $\left[Ans: -\frac{3}{64}\cos 2x+\frac{1}{192}\cos 6x+c\right]$

18. $\int \frac{\cos 2x+2\sin^2 x}{\cos^2 x}dx$ $[Ans: \tan x+c]$

19. $\int \tan^2 x dx$ $[Ans: \tan x-x+c]$

20. $\int (\tan x+\cot x)^2 dx$ $[Ans: \tan x-\cot x+c]$

21. $\int \sin x\sec^2 x dx$ $[Ans: \sec x+c]$

22. $\int \sin x\cos x dx$ $\left[Ans: -\frac{1}{4}\cos 2x+c\right]$

23. $\int \sin 2x\cos 3x dx$ $\left[Ans: \frac{1}{2}\cos x-\frac{1}{10\cos 5x}+c\right]$

24. $\int \cos x\cos 2x\cos 3x dx$ $\left[Ans: \frac{x}{4}+\frac{1}{8}\sin 2x+\frac{1}{16}\sin 4x+\frac{1}{24}\sin 6x+c\right]$

25. $\int \frac{dx}{1+\sin x}$ $[Ans: \tan x-\sec x+c]$

26. $\int \frac{dx}{1+\cos x}$ $\left[Ans: \tan\frac{x}{2}+c\right]$

27. $\int \sqrt{1+\cos x}dx$ $\left[Ans: 2\sqrt{2}\sin\frac{x}{2}+c\right]$

28. $\int \sqrt{1-\sin 2x}dx$ $[Ans: \sin x+\cos x+c]$

29. $\int \sqrt{1+\sin x}dx$ $\left[Ans: 2\left(\sin\frac{x}{2}+\cos\frac{x}{2}\right)+c\right]$

30. $\int \sec^2 x \operatorname{cosec}^2 x dx$ $\quad [Ans: \tan x - \cot x + c]$

31. $\int \cos x \sqrt{1+\cos 2x} dx$ $\quad \left[Ans: \frac{1}{\sqrt{2}}(x+\sin x \cos x)+c\right]$

32. $\int \frac{\sin x}{1+\sin x} dx$ $\quad [Ans: \sec x - \tan x + x + c]$

33. $\int \frac{\operatorname{cosec} x}{\operatorname{cosec} x - \cot x} dx$ $\quad [Ans: -\operatorname{cosec} x - \cot x + c]$

34. $\int \frac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha} dx$ $\quad [Ans: 2(\sin x + x\cos\alpha)+c]$

35. $\int \left(\frac{4-5\sin x}{\cos^2 x} + \frac{1}{\sin^2 x \cos^2 x}\right) dx$ $\quad [Ans: 5\tan x - 5\sec x - \cot x + c]$

36. $\int \frac{\sec x}{\sec x + \tan x} dx$ $\quad [Ans: \tan x - \sec x + c]$

37. $\int \frac{7\cos^3 x + 8\sin^3 x}{3\sin^2 x \cos^2 x} dx$ $\quad \left[Ans: \frac{8}{3}\sec x - \frac{7}{3}\operatorname{cosec} x + c\right]$

38. $\int \frac{\sin^6 x + \cos^6 x}{\sin^2 x \cos^2 x} dx$ $\quad [Ans: \tan x - \cot x - 3x + c]$

39. $\int \sin^6 x dx$ $\quad \left[Ans: \frac{1}{32}\left\{10x - \frac{15}{2}\sin 2x + \frac{3}{2}\sin 4x - \frac{1}{6}\sin 6x\right\}+c\right]$

40. $\int \cos^8 x dx$ $\quad \left[Ans: \frac{1}{128}\left\{35x + 28\sin 2x + 7\sin 4x + \frac{4}{3}\sin 6x + \frac{1}{8}\sin 8x\right\}+c\right]$

41. $\int (ax+b)^n dx$ $\quad \left[Ans: \frac{1}{a}\frac{(ax+b)^{n+1}}{n+1}+c\right]$

42. $\int \sqrt{ax+b} dx$ $\quad \left[Ans: \frac{2}{3a}(ax+b)^{\frac{3}{2}}+c\right]$

43. $\int \sec^2(ax+b) dx$ $\quad \left[Ans: \frac{1}{a}\tan(ax+b)+c\right]$

44. $\int 2\sin\left(\frac{\pi t}{2} - \frac{\pi}{4}\right) dt$ $\quad \left[Ans: -\frac{4}{\pi}\cos\left(\frac{\pi t}{2} - \frac{\pi}{4}\right)+c\right]$

45. $\int \sqrt{1+\sin\frac{x}{2}}\, dx$ $\quad \left[Ans: 4\left(\sin\frac{x}{4} - \cos\frac{x}{4}\right)+c\right]$

46. $\int x\sqrt{x^2+5}dx$ $\left[Ans: \frac{1}{3}\left(x^2+5\right)^{\frac{3}{2}}+c\right]$

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

$\left[Ans: 2\sqrt{x^2-x-1}+c\right]$

48. $\int x\sqrt{1+x}dx$ $\left[Ans: 2\left\{\frac{(1+x)^{\frac{5}{2}}}{5}-\frac{(1+x)^{\frac{3}{2}}}{3}\right\}+c\right]$

49. $\int \frac{x^2}{\sqrt{x+1}}dx$ $\left[Ans: 2\sqrt{x+1}\left\{\frac{1}{5}(x+1)^2-\frac{2}{3}(x+1)+1\right\}+c\right]$

50. $\int \frac{\sin\sqrt{x}}{\sqrt{x}}dx$ $\left[Ans: -2\cos\sqrt{x}+c\right]$

51. $\int \sin^2 x\cos x dx$ $\left[Ans: \frac{1}{3}\sin^3 x+c\right]$

52. $\int \frac{x^2}{(a+bx)^2}dx$ $\left[Ans: \frac{1}{b^3}\left\{(a+bx)-2a\log|a+bx|-\frac{a^2}{a+bx}\right\}+c\right]$

53. $\int \sqrt{2+\sin 3x}\cos 3x dx$ $\left[Ans: \frac{2}{9}(2+\sin 3x)^{\frac{3}{2}}+c\right]$

54. $\int \frac{\sin x}{(a+b\cos x)^2}dx$ $\left[Ans: \frac{1}{b(a+b\cos x)}+c\right]$

55. $\int \frac{\sec^4 x}{\sqrt{\tan x}}dx$ $\left[Ans: 2\left\{\sqrt{\tan x}+\frac{1}{5}(\tan x)^{\frac{5}{2}}\right\}+c\right]$

56. $\int x\sin^3\left(x^2\right)\cos\left(x^2\right)dx$ $\left[Ans: \frac{1}{8}\sin^4\left(x^2\right)+c\right]$

57. $\int \sec^4 x\tan x dx$ $\left[Ans: \frac{1}{4}\sec^4 x+c\right]$

58. $\int \sec^4 x dx$ $\left[Ans: \tan x+\frac{1}{3}\tan^3 x+c\right]$

59. $\int \tan^4 x dx$ $\left[Ans: \tan x+\frac{1}{3}\tan^3 x+c\right]$

60. $\int \frac{x^3}{\left(x^2+1\right)^3}dx$ $\left[Ans: -\frac{\left(1+2x^2\right)}{4\left(x^2+1\right)^2}+c\right]$

61. $\int \frac{dx}{\sqrt{1+\sqrt{x}}}$ $\left[Ans: \frac{4}{3}\left(1+\sqrt{x}\right)^{\frac{3}{2}}-4\left(1+\sqrt{x}\right)^{\frac{1}{2}}+c\right]$

62. $\int \frac{x}{\sqrt{x+5}}dx$ $\left[Ans: \frac{2}{3}(x-10)\sqrt{x+5}+c\right]$

63. $\int \frac{dx}{\sqrt{2x+3}+\sqrt{2x-3}}$ $\left[Ans: \frac{1}{18}(2x+3)^{\frac{3}{2}}-\frac{1}{18}(2x-3)^{\frac{3}{2}}+c\right]$

64. $\int \cot^3 x \operatorname{cosec}^4 x dx$ $\left[Ans: -\frac{1}{4}\cot^4 x-\frac{1}{6}\cot^6 x+c\right]$

65. $\int \frac{5}{3x-7}dx$ $\left[Ans: \frac{5}{3}\log|3x-7|+c\right]$

66. $\int \frac{4}{9-2x}dx$ $\left[Ans: -2\log|9-2x|+c\right]$

67. $\int \frac{f'(x)}{f(x)}dx$ $\left[Ans: \log|f(x)|+c\right]$

68. $\int \frac{2x-3}{x^2-3x+7}dx$ $\left[Ans: \log|x^2-3x+7|+c\right]$

69. $\int \cot x dx$ $\left[Ans: \log|\sin x|+c\right]$

70. $\int \tan x dx$ $\left[Ans: \log|\sec x|+c\right]$

71. $\int \frac{x}{x^2-1}dx$ $\left[Ans: \frac{1}{2}\log|x^2-1|+c\right]$

72. $\int \frac{x^2}{2-x^3}dx$ $\left[Ans: -\frac{1}{3}\log|2-x^3|+c\right]$

73. $\int \frac{2x-3}{1+3x-x^2}dx$ $\left[Ans: -\log|1+3x-x^2|+c\right]$

74. $\int \frac{\sec^2 x}{1+\tan x}dx$ $\left[Ans: \log|1+\tan x|+c\right]$

75. $\int \frac{\sin x}{a+b\cos x}dx$ $\left[Ans: -\frac{1}{b}\log|a+b\cos x|+c\right]$

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