Properties of Integration, fundamental Integration formulae

Basic Level

1. $\int \sec x \, dx =$ [MP PET 1988,95; Rajasthan PET 1996]

(a) $\log \tan\left(\dfrac{\pi}{4} - \dfrac{x}{2}\right) + c$ (b) $\log(\sec x - \tan x) + c$ (c) $\log\left(\dfrac{\pi}{4} + x\right) + c$ (d) $\log(\sec x + \tan c) + c$

2. $\int 5 \sin x \, dx =$ [MP PET 1988]

(a) $5 \cos x + c$ (b) $-5 \cos x + c$ (c) $5 \sin x + c$ (d) $-5 \sin x + c$

3. $\int (\sec x + \tan x)^2 \, dx =$ [MP PET 1987, 92]

(a) $2(\sec x + \tan x) - x + c$ (b) $\dfrac{1}{3}(\sec x + \tan x)^3 + c$ (c) $\sec x(\sec x + \tan x) + c$ (d) $2(\sec x + \tan x) + c$

4. $\int \operatorname{cosec}^2 x \, dx$ is equal to [MP PET 1999]

(a) $\cot x + C$ (b) $-\cot x + C$ (c) $\tan^2 x + C$ (d) $-\cot^2 x + C$

5. $\int \sec x \tan x \, dx =$ [Rajasthan PET 2003]

(a) $\sec x + \tan x + C$ (b) $\sec x + C$ (c) $\tan x + C$ (d) $-\sec x + C$

6. $\int \dfrac{\sin x + \cos x}{\sqrt{1 + \sin 2x}} \, dx =$ [MP PET 1990]

(a) $\sin x + c$ (b) $\cos x + c$ (c) $x + c$ (d) $x^2 + c$

7. $\int (3 \operatorname{cosec}^2 x + 2 \sin 3x) \, dx =$ [AI CBSE 1981]

(a) $3 \cot x + \dfrac{2}{3} \cos 3x + c$ (b) $-\left(3 \cot x + \dfrac{2}{3} \cos 3x\right) + c$ (c) $3 \cot x - \dfrac{2}{3} \cos 3x + c$ (d) None of these

8. $\int \dfrac{1 + \cos^2 x}{\sin^2 x} \, dx =$ [MP PET 1993; Ranchi BIT 1982]

(a) $-\cot x - 2x + c$ (b) $-2 \cot x - 2x + c$ (c) $-2 \cot x - x + c$ (d) $-2 \cot x + x + c$

9. The value of $\int \cot x \, dx$ is [Rajasthan PET 1995]

(a) $\log \cos x + c$ (b) $\log \tan x + c$ (c) $\log \sin x + c$ (d) $\log \sec x + c$

10. The value of $\int \dfrac{1}{(x-5)^2} \, dx$ is

(a) $\dfrac{1}{x-5} + c$ (b) $-\dfrac{1}{x-5} + c$ (c) $\dfrac{2}{(x-5)^3} + c$ (d) $-2(x-5)^3 + c$

11. $\int \frac{x^2}{x^2+4}dx$ equals to

(a) $x - 2\tan^{-1}(x/2)+c$ (b) $x + 2\tan^{-1}(x/2)+c$ (c) $x - 4\tan^{-1}(x/2)+c$ (d) $x + 4\tan^{-1}(x/2)+c$

12. $\int x^2 \sec x^3 dx =$

(a) $\log(\sec x^3 + \tan x^3)$ (b) $3(\sec x^3 + \tan x^3)$ (c) $\frac{1}{3}\log(\sec x^3 + \tan x^3)$ (d) None of these

13. $\int \frac{\cos 2x - 1}{\cos 2x + 1}dx =$

(a) $\tan x - x + c$ (b) $x + \tan x + c$ (c) $x - \tan x + c$ (d) $-x - \cot x + c$

14. $\int \sin^{-1}(\cos x)dx =$

(a) $\frac{\pi x}{2}$ (b) $\frac{\pi x^2}{2}$ (c) $\frac{\pi x - x^2}{2}$ (d) $\frac{\pi x + x^2}{2}$

15. $\int (\sin^{-1} x + \cos^{-1} x)dx =$

(a) $\frac{1}{2}\pi x + c$ (b) $x(\sin^{-1} x - \cos^{-1} x)+c$ (c) $x(\cos^{-1} x + \sin^{-1} x)+c$ (d) $\frac{\pi}{2}+x+c$

16. $\int x^{51}(\tan^{-1} x + \cot^{-1} x)dx =$

(a) $\frac{x^{52}}{52}(\tan^{-1} x + \cot^{-1} x)+c$ (b) $\frac{x^{52}}{52}(\tan^{-1} x - \cot^{-1} x)+c$

(c) $\frac{\pi x^{52}}{104}+\frac{\pi}{2}+c$ (d) $\frac{\pi x^{52}}{52}+\frac{\pi}{2}+c$

17. The value of $\int \frac{1}{x^4}dx$ is

(a) $\frac{1}{-3x^3}+c$ (b) $\frac{1}{3x^3}+c$ (c) $\frac{1}{-4x^3}+c$ (d) $-\frac{1}{3x^3}+c$

18. $\int a^x dx =$

(a) $\frac{a^x}{\log a}+C$ (b) $a^x \log a + C$ (c) $\log a + c$ (d) $a^x + C$

19. $\int a^x da =$

(a) $\frac{a^x}{\log_e a}+C$ (b) $a^x \log_e a + C$ (c) $\frac{a^x}{x+1}+C$ (d) None of these

20. $\int 13^x dx =$

(a) $\frac{13^x}{\log 13}+C$ (b) $13^{x+1}+C$ (c) $14x+C$ (d) $14^{x+1}+C$

21. $\int e^{x\log a}.e^x dx$ is equal to

(a) $(ae)^x$ (b) $\frac{(ae)^x}{\log(ae)}$ (c) $\frac{e^x}{1+\log a}$ (d) None of these

22. $\int a^{3x+3} dx =$ [Roorkee 1977]

(a) $\dfrac{a^{3x+3}}{\log a} + c$ (b) $\dfrac{a^{3x+3}}{3 \log a} + c$ (c) $a^{3x+3} \log a + c$ (d) $3a^{3x+3} \log a + c$

23. $\int e^{\log(\sin x)} dx =$ [MP PET 1995]

(a) $\sin x + c$ (b) $-\cos x + c$ (c) $e^{\log \cos x} + c$ (d) None of these

24. The value of $\int e^{m \log x} dx$ is

(a) $\dfrac{x^{m+1}}{m+1} + k$ (b) $\dfrac{e^{m \log x}}{m} + k$ (c) $\dfrac{e^m}{\log x} + k$ (d) $\dfrac{e^m}{x} + k$

25. $\int \dfrac{e^{5 \log x} - e^{4 \log x}}{e^{3 \log x} - e^{2 \log x}} dx =$ [MNR 1985]

(a) $e \cdot 3^{-3x} + c$ (b) $e^3 \log x + c$ (c) $\dfrac{x^3}{3} + c$ (d) None of these

26. If $f'(x) = \dfrac{1}{x} + x$ and $f(1) = \dfrac{5}{2}$, then $f(x) =$

(a) $\log x + \dfrac{x^2}{2} + 2$ (b) $\log x + \dfrac{x^2}{2} + 1$ (c) $\log x - \dfrac{x^2}{2} + 2$ (d) $\log x - \dfrac{x^2}{2} + 1$

27. $\int \sqrt{1 + \sin x}\, dx =$ [MP PET 1995]

(a) $\dfrac{1}{2}\left(\sin \dfrac{x}{2} + \cos \dfrac{x}{2}\right) + c$ (b) $\dfrac{1}{2}\left(\sin \dfrac{x}{2} - \cos \dfrac{x}{2}\right) + c$ (c) $2\sqrt{1 + \sin x} + c$ (d) $-2\sqrt{1 - \sin x} + c$

28. $\int \sqrt{1 + \sin \dfrac{x}{2}}\, dx =$ [IIT 1980; MP PET 1989]

(a) $\dfrac{1}{4}\left(\cos \dfrac{x}{4} - \sin \dfrac{x}{4}\right) + c$ (b) $4\left(\cos \dfrac{x}{4} - \sin \dfrac{x}{4}\right) + c$ (c) $4\left(\sin \dfrac{x}{4} - \cos \dfrac{x}{4}\right) + c$ (d) $4\left(\sin \dfrac{x}{4} + \cos \dfrac{x}{4}\right) + c$

29. $\int \sqrt{1 - \sin 2x}\, dx = \ldots\ldots\ldots\ldots, \ x \in (0, \pi/4)$ [MP PET 1987]

(a) $-\sin x + \cos x$ (b) $\sin x - \cos x$ (c) $\tan x + \sec x$ (d) $\sin x + \cos x$

30. $\int \dfrac{dx}{1 - \sin x} =$ [MP PET 1991]

(a) $x + \cos x + c$ (b) $1 + \sin x + c$ (c) $\sec x - \tan x + c$ (d) $\sec x + \tan x + c$

31. $\int \dfrac{\cos x - 1}{\cos x + 1} dx =$ [MP PET 1989, 92]

(a) $2 \tan \dfrac{x}{2} - x + c$ (b) $\dfrac{1}{2} \tan \dfrac{x}{2} - x + c$ (c) $x - \dfrac{1}{2} \tan \dfrac{x}{2} + c$ (d) $x - 2 \tan \dfrac{x}{2} + c$

32. $\int \sqrt{1 + \cos x}\, dx$ equals [Rajasthan PET 1996]

(a) $2\sqrt{2} \sin \dfrac{x}{2} + c$ (b) $-2\sqrt{2} \sin \dfrac{x}{2} + c$ (c) $-2\sqrt{2} \cos \dfrac{x}{2} + c$ (d) $2\sqrt{2} \cos \dfrac{x}{2} + c$

33. $\int \dfrac{dx}{\sqrt{x} + \sqrt{x-2}} =$ [MP PET 1990]

(a) $\dfrac{1}{3}\left[x^{3/2} - (x-2)^{3/2}\right] + c$ (b) $\dfrac{2}{3}\left[x^{3/2} - (x-2)^{3/2}\right] + c$ (c) $\dfrac{1}{3}\left[(x-2)^{3/2} - x^{3/2}\right] + c$ (d) $\dfrac{2}{3}\left[(x-2)^{3/2} - x^{3/2}\right] + c$

34. $\displaystyle\int \frac{dx}{\sqrt{x+a}+\sqrt{x+b}} =$ **[AISSE 1989]**

(a) $\dfrac{2}{3(b-a)}\left[(x+a)^{3/2}-(x+b)^{3/2}\right]+c$

(b) $\dfrac{2}{3(a-b)}\left[(x+a)^{3/2}-(x+b)^{3/2}\right]+c$

(c) $\dfrac{2}{3(a-b)}\left[(x+a)^{3/2}+(x+b)^{3/2}\right]+c$

(d) None of these

35. $\displaystyle\int \frac{3x^3-2\sqrt{x}}{x}\,dx =$ **[Roorkee 1976]**

(a) $x^3-\sqrt{x}+c$
(b) $x^3+\sqrt{x}+c$
(c) $x^3-2\sqrt{x}+c$
(d) $x^3-4\sqrt{x}+c$

36. $\displaystyle\int \frac{5(x^6+1)}{x^2+1}\,dx =$

(a) $5(x^7+x)\tan^{-1}x+c$

(b) $x^5-\dfrac{5}{3}x^3+5x+c$

(c) $3x^4-5x^2+15x+c$

(d) $5\tan^{-1}(x^2-1)+\log(x^2+1)+c$

37. $\displaystyle\int \frac{dx}{\tan x+\cot x} =$ **[MP PET 1991]**

(a) $\dfrac{\cos 2x}{4}+c$
(b) $\dfrac{\sin 2x}{4}+c$
(c) $-\dfrac{\sin 2x}{4}+c$
(d) $-\dfrac{\cos 2x}{4}+c$

38. $\displaystyle\int \left(2\sin x+\frac{1}{x}\right)dx$ is equal to **[MP PET 1999]**

(a) $-2\cos x+\log x+C$
(b) $2\cos x+\log x+C$
(c) $-2\sin x-\dfrac{1}{x^2}+C$
(d) $-2\cos x+\dfrac{1}{x^2}+C$

39. $\displaystyle\int \sin 2x\,\cos 3x\,dx =$ **[Roorkee 1976]**

(a) $\dfrac{1}{2}\left(\cos x+\dfrac{1}{5}\cos 5x\right)+c$
(b) $\dfrac{1}{2}\left(\cos x-\dfrac{1}{5}\cos 5x\right)+c$
(c) $\cos x+\dfrac{1}{5}\cos 5x+c$
(d) $\cos x-\dfrac{1}{5}\cos 5x+c$

40. If $\displaystyle\int (\sin 2x-\cos 2x)dx=\frac{1}{\sqrt{2}}\sin(2x-a)+b,$ then **[Roorkee 1978; MP PET 2001]**

(a) $a=\dfrac{\pi}{4},b=0$
(b) $a=-\dfrac{\pi}{4},b=0$
(c) $a=\dfrac{5\pi}{4},b=$ any constant
(d) $a=-\dfrac{5\pi}{4},b=$ any constant

41. If $\displaystyle\int (\sin 2x+\cos 2x)\,dx=\frac{1}{\sqrt{2}}\sin(2x-c)+a,$ then the value of a and c is **[Roorkee 1978]**

(a) $c=\dfrac{\pi}{4}$ and $a=k$ (an arbitrary constant)

(b) $c=-\dfrac{\pi}{4}$ and $a=\dfrac{\pi}{2}$

(c) $c=\dfrac{\pi}{2}$ and a is an arbitrary constant

(d) None of these

42. If $\displaystyle\int \sin 5x\cos 3x\,dx=-\frac{\cos 8x}{16}+A,$ then $A=$ **[MP PET 1992]**

(a) $\dfrac{\sin 2x}{16}+$ constant
(b) $-\dfrac{\cos 2x}{4}+$ constant
(c) Constant
(d) None of these

43. If $\displaystyle\int \sqrt{2}\sqrt{1+\sin x}\,dx=-4\cos(ax+b)+C$ then the value of (a,b) is **[UPSEAT 2002]**

(a) $\dfrac{1}{2},\dfrac{\pi}{4}$
(b) $1,\dfrac{\pi}{2}$
(c) $1,1$
(d) None of these

44. $\int \dfrac{\sin x + \operatorname{cosec} x}{\tan x} dx =$

(a) $\sin x - \operatorname{cosec} x + c$ (b) $\operatorname{cosec} x - \sin x + c$ (c) $\log \tan x + c$ (d) $\log \cot x + c$

45. $\int \dfrac{1}{\sqrt{1+\sin x}} dx =$ **[Rajasthan PET 1996]**

(a) $2\sqrt{2} \log \tan\left(\dfrac{\pi}{8} + \dfrac{x}{4}\right) + c$ (b) $\dfrac{1}{\sqrt{2}} \log \tan\left(\dfrac{\pi}{8} + \dfrac{x}{4}\right) + c$ (c) $\sqrt{2} \log \tan\left(\dfrac{\pi}{8} + \dfrac{x}{4}\right) + c$ (d) $\dfrac{1}{2\sqrt{2}} \log \tan\left(\dfrac{\pi}{8} + \dfrac{x}{4}\right) + c$

46. $\int \dfrac{\sin^2 x - \cos^2 x}{\sin^2 x \cos^2 x} dx =$ **[MP PET 1996]**

(a) $\tan x + \cot x + c$ (b) $\tan x + \operatorname{cosec} x + c$ (c) $-\tan x + \cot x + c$ (d) $\tan x + \sec x + c$

47. $\int \dfrac{1 - \tan x}{1 + \tan x} dx =$ **[MP PET 1994]**

(a) $\log \sec\left(\dfrac{\pi}{4} - x\right) + c$ (b) $\log \cos\left(\dfrac{\pi}{4} + x\right) + c$ (c) $\log \sin\left(\dfrac{\pi}{4} + x\right) + c$ (d) None of these

48. $\int \dfrac{\cos 2x}{\cos x} dx$ is equal to   **[Rajasthan PET 1991]**

(a) $2 \sin x + \log(\sec x - \tan x) + c$ (b) $2 \sin x - \log(\sec x - \tan x) + c$

(c) $2 \sin x + \log(\sec x + \tan x) + c$ (d) $2 \sin x - \log(\sec x + \tan x) + c$

49. $\int \dfrac{(1+x)^3}{\sqrt{x}} dx$ equals   **[Rajasthan PET 1990]**

(a) $\dfrac{2}{7} x^{7/2} + \dfrac{6}{5} x^{5/2} + 2x^{3/2} + 2x^{1/2} + c$ (b) $\dfrac{2}{5} x^{7/2} + 2x^{5/2} + 6x^{3/2} + 2x^{1/2} + c$

(c) $\dfrac{2}{7} x^{7/2} - \dfrac{6}{5} x^{5/2} + 2x^{3/2} - 2x^{1/2} + c$ (d) None of these

50. $\int \dfrac{dx}{9x^2 - 4} =$

(a) $\dfrac{1}{12} \log\left|\dfrac{3x+2}{3x-2}\right| + c$ (b) $\dfrac{1}{6} \log\left|\dfrac{3x+2}{3x-2}\right| + c$ (c) $\dfrac{1}{12} \log\left|\dfrac{3x-2}{3x+2}\right| + c$ (d) $\dfrac{1}{6} \log\left|\dfrac{3x-2}{3x+2}\right| + c$

51. $\int \dfrac{dx}{a^2 - x^2}$ is equal to   **[DCE 2002]**

(a) $\dfrac{1}{a} \tan^{-1}\left(\dfrac{x}{a}\right)$ (b) $\dfrac{1}{2a} \sin\left(\dfrac{a-x}{a+x}\right)$ (c) $\dfrac{1}{2a} \log\left(\dfrac{a+x}{a-x}\right)$ (d) $\dfrac{1}{2a} \log\left(\dfrac{a-x}{a+x}\right)$

52. $\int \sqrt{x^2 + a^2}\, dx$ is equal to   **[Rajasthan PET 2001]**

(a) $\dfrac{x}{2}\sqrt{x^2+a^2} - \dfrac{a^2}{2} \log\{x + \sqrt{x^2+a^2}\} + C$ (b) $\dfrac{x}{2}\sqrt{x^2+a^2} + \dfrac{a^2}{2} \log\{x + \sqrt{x^2+a^2}\} + C$

(c) $\dfrac{x}{2}\sqrt{x^2+a^2} - \dfrac{a^2}{2} \log\{x - \sqrt{x^2+a^2}\} + C$ (d) $\dfrac{x}{2}\sqrt{x^2+a^2} + \dfrac{a^2}{2} \log\{x - \sqrt{x^2+a^2}\} + C$

53. $\int \dfrac{dx}{4x^2 + 9} =$ **[MP PET 1991; Roorkee 1977; MNR 1974]**

(a) $\dfrac{1}{2} \tan^{-1}\left(\dfrac{2x}{3}\right) + c$ (b) $\dfrac{3}{2} \tan^{-1}\left(\dfrac{2x}{3}\right) + c$ (c) $\dfrac{1}{6} \tan^{-1}\left(\dfrac{2x}{3}\right) + c$ (d) $\dfrac{1}{6} \tan^{-1}\left(\dfrac{3x}{2}\right) + c$

54. $\int (x-a)(x-b)(x-c)\ldots\ldots(x-z)dx$ is equal to

(a) Constant   (b) $5c + 5d + x$ (c) 0   (d) None of these

55. If $f'(x) = \sqrt{x}$ and $f(1) = 2,$ then $f(x) =$

(a) $\sqrt{x} + 2$ (b) $x\sqrt{x} + 2$ (c) $\dfrac{3}{2}(x\sqrt{x} + 2)$ (d) $\dfrac{2}{3}(x\sqrt{x} + 2)$

56. If $f(x) = \int x^{m-1} dx$ then $f^{(m+1)} x = 0,$ where

(a) m is a negatve integer   (b) $m = 0$ (c) m is not an integer   (d)

57. A primitive of $|x|,$ when $x < 0$ is   **[SCRA 1999]**

(a) $\dfrac{1}{2}x^2 + c$ (b) $\dfrac{-1}{2}x^2 + c$ (c) $x + c$ (d) $-x + c$

58. $\displaystyle\int \dfrac{\operatorname{cosec}\theta - \cot\theta}{\operatorname{cosec}\theta + \cot\theta} d\theta =$

(a) $2\operatorname{cosec}\theta - 2\cot\theta - \theta + c$ (b) $2\cos ec\theta - 2\cot\theta + \theta + c$ (c) $2\cos ec\theta + 2\cot\theta - \theta + c$ (d) None of these

59. $\displaystyle\int (e^{a\log x} + e^{x\log a}) dx =$

(a) $x^{a+1} + \dfrac{a^x}{\log a} + c$ (b) $\dfrac{x^{a+1}}{a+1} + a^x \log a + c$ (c) $\dfrac{x^{a+1}}{a+1} + \dfrac{a^x}{\log a} + c$ (d) None of these

60. $\displaystyle\int \dfrac{dx}{4\cos^3 2x - 3\cos 2x} =$

(a) $\dfrac{1}{3}\log[\sec 6x + \tan 6x] + c$ (b) $\dfrac{1}{6}\log[\sec 6x + \tan 6x] + c$ (c) $\log[\sec 6x + \tan 6x] + c$ (d) None of these

Advance Level

61. $\displaystyle\int \dfrac{dx}{\sin^2 x \cos^2 x} =$ **[Roorkee1976; Rajasthan PET 1991]**

(a) $\tan x + \cot x + c$ (b) $\cot x - \tan x + c$ (c) $\tan x - \cot x + c$ (d) None of these

62. $\displaystyle\int \dfrac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha} dx =$ **[MP PET 1994]**

(a) $2[\sin x + x\cos\alpha] + c$ (b) $2[\sin x + \sin\alpha] + c$ (c) $2[-\sin x + x\cos\alpha] + c$ (d) $-2[\sin x + \sin\alpha] + c$

63. $\displaystyle\int \dfrac{\sin^8 x - \cos^8 x}{1 - 2\sin^2 x \cos^2 x} dx =$ **[IIT 1986]**

(a) $\sin 2x + c$ (b) $-\dfrac{1}{2}\sin 2x + c$ (c) $\dfrac{1}{2}\sin 2x + c$ (d) $-\sin 2x + c$

64. $\{1 + 2\tan x(\tan x + \sec x)\}^{1/2}$ **[Roorkee 1987]**

(a) $\log(\sec x + \tan x) + c$ (b) $\log(\sec x + \tan x)^{1/2} + c$ (c) $\log\sec x(\sec x + \tan x) + c$ (d) None of these

65. If $\displaystyle\int \dfrac{\cos 4x + 1}{\cot x - \tan x} dx = A\cos 4x + B,$ then

(a) $A = \dfrac{-1}{2}$ (b) $A = \dfrac{-1}{8}$ (c) $A = \dfrac{-1}{4}$ (d) None of these

66. If $x = f''(t)\cos t + f'(t)\sin t, y = -f''(t)\sin t + f'(t)\cos t,$ then $\displaystyle\int \left[\left(\dfrac{dx}{dt}\right)^2 + \left(\dfrac{dy}{dt}\right)^2\right]^{1/2} dt$ is equal to   **[SCRA 1999]**

(a) $f'(t) + f''(t) + c$ (b) $f''(t) + f'''(t) + c$ (c) $f(t) + f''(t) + c$ (d) $f'(t) - f''(t) + c$

67. If $f(0) = f'(0) = 0$ and $f''(x) = \tan^2 x$ then $f(x)$ is

(a) $\log \sec x - \dfrac{1}{2}x^2$ (b) $\log \cos x + \dfrac{1}{2}x^2$ (c) $\log \sec x + \dfrac{1}{2}x^2$ (d) None of these

68. $\displaystyle\int \dfrac{\cos 2x}{(\sin x + \cos x)^2}\,dx$ is equal to

(a) $\dfrac{-1}{\sin x + \cos x} + C$ (b) $\log(\sin x + \cos x) + C$ (c) $\log(\sin x - \cos x) + C$ (d) $\log(\sin x + \cos x)^2 + C$

69. If $\displaystyle\int \dfrac{\cos^4 x}{\sin^2 x}\,dx = A\cot x + b\sin 2x + C\dfrac{x}{2} + D,$ then

(a) $A = -2$ (b) $B = -1/4$ (c) $C = -3$ (d) None of these

70. $\displaystyle\int \dfrac{\tan x}{\sec x + \tan x}\,dx =$

(a) $\sec x + \tan x - x + c$ (b) $\sec x - \tan x + x + c$ (c) $\sec x + \tan x + x + c$ (d) $-\sec x - \tan x + x + c$

Integration by substitution

Basic Level

71. A primitive of $\dfrac{x}{x^2 + 1}$ is   **[SCRA 1996]**

(a) $\log_e(x^2 + 1)$ (b) $x\tan^{-1} x$ (c) $\dfrac{\log_e(x^2 + 1)}{2}$ (d) $\dfrac{1}{2}x\tan^{-1} x$

72. The value of $\displaystyle\int \dfrac{x^3}{\sqrt{1 + x^4}}\,dx$ is   **[SCRA 1996]**

(a) $(1 + x^4)^{1/2} + c$ (b) $-(1 + x^4)^{1/2} + c$ (c) $\dfrac{1}{2}(1 + x^4)^{1/2} + c$ (d) $-\dfrac{1}{2}(1 + x^4)^{1/2} + c$

73. $\displaystyle\int \sqrt{\dfrac{1 + x}{1 - x}}\,dx =$ **[Rajasthan PET 2002]**

(a) $-\sin^{-1} x - \sqrt{1 - x^2} + c$ (b) $\sin^{-1} x + \sqrt{1 - x^2} + c$ (c) $\sin^{-1} x - \sqrt{1 - x^2} + c$ (d) $-\sin^{-1} x - \sqrt{x^2 - 1} + c$

74. $\displaystyle\int x^x(1 + \log x)\,dx$ is equal to

(a) x^x (b) x^{2x} (c) $x^x \log x$ (d) $\dfrac{1}{2}(1 + \log x)^2$

75. $\displaystyle\int \dfrac{(x + 1)(x + \log x)^2}{x}\,dx =$ **[AI CBSE 1986]**

(a) $\dfrac{1}{3}(x + \log x) + c$ (b) $\dfrac{1}{3}(x + \log x)^2 + c$ (c) $\dfrac{1}{3}(x + \log x)^3 + c$ (d) None of these

76. $\displaystyle\int \dfrac{x^2 + 1}{x(x^2 - 1)}\,dx$ is equal to   **[MP PET 1999]**

(a) $\log \dfrac{x^2 - 1}{x} + C$ (b) $-\log \dfrac{x^2 - 1}{x} + C$ (c) $\log \dfrac{x}{x^2 + 1} + C$ (d) $-\log \dfrac{x}{x^2 + 1} + C$

77. $\int \dfrac{1}{x^2(x^4+1)^{3/4}}\, dx =$

(a) $\dfrac{(x^4+1)^{1/4}}{x}+c$

(b) $-\dfrac{(x^4+1)^{1/4}}{x}+c$

(c) $\dfrac{3}{4}\dfrac{(x^4+1)^{3/4}}{x}+c$

(d) $\dfrac{\frac{4}{3}(x^4+1)^{3/4}}{x}+c$

78. $\int x\cos x^2\, dx$ is equal to

(a) $-\dfrac{1}{2}\sin^2 x + C$

(b) $\dfrac{1}{2}\sin^2 x + C$

(c) $-\dfrac{1}{2}\sin x^2 + C$

(d) $\dfrac{1}{2}\sin x^2 + C$

79. $\int e^{-x}\operatorname{cosec}^2(2e^{-x}+5)\,dx =$

(a) $\dfrac{1}{2}\cot(2e^{-x}+5)+c$

(b) $-\dfrac{1}{2}\cot(2e^{-x}+5)+c$

(c) $2\cot(2e^{-x}+5)+c$

(d) $-2\cot(2e^{-x}+5)+c$

80. $\int \dfrac{1+\tan x}{x+\log\sec x}\,dx =$

(a) $\log(x+\log\sec x)+c$

(b) $-\log(x+\log\sec x)+c$

(c) $\log(x-\log\sec x)+c$

(d) None of these

81. $\int \dfrac{x^3}{\sqrt{x^2+2}}\,dx =$

(a) $\dfrac{1}{3}(x^2+2)^{3/2}+2(x^2+2)^{1/2}+c$

(b) $\dfrac{1}{3}(x^2+2)^{3/2}-2(x^2+2)^{1/2}+c$

(c) $\dfrac{1}{3}(x^2+2)^{3/2}+(x^2+2)^{1/2}+c$

(d) $\dfrac{1}{3}(x^2+2)^{3/2}-(x^2+2)^{1/2}+c$

82. $\int x^3\sqrt{3+5x^4}\,dx =$

(a) $(3+5x^4)^{3/2}+c$

(b) $\dfrac{1}{5}(3+5x^4)^{3/2}+c$

(c) $\dfrac{1}{30}(3+5x^4)^{3/2}+c$

(d) None of these

83. $\int \sin^2 x\cos x\, dx$ is equal to

(a) $\dfrac{\cos^2 x}{2}$

(b) $\dfrac{\sin^2 x}{3}$

(c) $\dfrac{\sin^3 x}{3}$

(d) $-\dfrac{\cos^2 x}{2}$

84. $\int \dfrac{(1+\log x)^2}{x}\,dx =$

(a) $(1+\log x)^3+c$

(b) $3(1+\log x)^3+c$

(c) $\dfrac{1}{3}(1+\log x)^3+c$

(d) None of these

85. $\int \dfrac{\sin x\, dx}{(a+b\cos x)^2} - =$

(a) $\dfrac{1}{b}(a+b\cos x)+c$

(b) $\dfrac{1}{b(a+b\cos x)}+c$

(c) $\dfrac{1}{b}\log(a+b\cos x)+c$

(d) None of these

86. $\int \cos^2(ax+b)\sin(ax+b)\,dx =$

(a) $-\dfrac{\cos^3(ax+b)}{3a}+c$

(b) $\dfrac{\cos^3(ax+b)}{3a}+c$

(c) $\dfrac{\sin^3(ax+b)}{3a}+c$

(d) $-\dfrac{\sin^3(ax+b)}{3a}+c$

87. $\int \dfrac{1+\tan^2 x}{1-\tan^2 x}\,dx$ equals to

(a) $\log\left(\dfrac{1-\tan x}{1+\tan x}\right)+C$

(b) $\log\left(\dfrac{1+\tan x}{1-\tan x}\right)+C$

(c) $\dfrac{1}{2}\log\left(\dfrac{1-\tan x}{1+\tan x}\right)+C$

(d) $\dfrac{1}{2}\log\left(\dfrac{1+\tan x}{1-\tan x}\right)+C$

88. $\int \dfrac{a^{\sqrt{x}}}{\sqrt{x}}\,dx =$ [Roorkee 1990; MP PET 2001]

(a) $2a^{\sqrt{x}} \log_e a + c$ (b) $2a^{\sqrt{x}} \log_a e + c$ (c) $2a^{\sqrt{x}} \log_{10} a + c$ (d) $2a^{\sqrt{x}} \log_a 10 + c$

89. $\int \dfrac{t}{e^{3t^2}}\,dt =$ [MP PET 1997]

(a) $\dfrac{1}{6} e^{3t^2} + c$ (b) $-\dfrac{1}{6} e^{3t^2} + c$ (c) $\dfrac{1}{6} e^{-3t^2} + c$ (d) $-\dfrac{1}{6} e^{-3t^2} + c$

90. $\int x e^{x^2}\,dx =$ [SCRA 1996; Rajasthan PET 2003]

(a) $-\dfrac{e^{x^2}}{2} + C$ (b) $\dfrac{e^{x^2}}{2} + C$ (c) $\dfrac{e^x}{2} + C$ (d) $-\dfrac{e^x}{2} + C$

91. $\int e^{\sqrt{x}}\,dx$ is equal to [MP PET 1988]

(a) $e^{\sqrt{x}} + A$ (b) $\dfrac{1}{2} e^{\sqrt{x}} + A$ (c) $2(\sqrt{x}-1)e^{\sqrt{x}} + A$ (d) $2(\sqrt{x}+1)e^{\sqrt{x}} + A$

(*A* is an arbitrary constant)

92. $\int \dfrac{e^{\sqrt{x}}}{\sqrt{x}}\,dx =$ [DCE 1999]

(a) $e^{\sqrt{x}}$ (b) $\dfrac{e^{\sqrt{x}}}{2}$ (c) $2e^{\sqrt{x}}$ (d) $\sqrt{x}\,e^{\sqrt{x}}$

93. $\int \dfrac{a\,dx}{b + ce^x} =$ [MP PET 1988; BIT Ranchi 1978]

(a) $\dfrac{a}{b} \log\left[\dfrac{e^x}{b+ce^x}\right] + k$ (b) $\dfrac{a}{b} \log\left[\dfrac{b+ce^x}{e^x}\right] + k$ (c) $\dfrac{b}{a} \log\left[\dfrac{e^x}{b+ce^x}\right] + k$ (d) $\dfrac{b}{a} \log\left[\dfrac{b+ce^x}{e^x}\right] + k$

94. $\int \dfrac{1}{(e^x + e^{-x})^2}\,dx =$

(a) $-\dfrac{1}{2(e^{2x}+1)} + c$ (b) $\dfrac{1}{2(e^{2x}+1)} + c$ (c) $-\dfrac{1}{e^{2x}+1} + c$ (d) None of these

95. $\int \dfrac{e^{2x}-1}{e^{2x}+1}\,dx =$ [MP PET 1987]

(a) $\dfrac{e^{2x}-1}{e^{2x}+1} + c$ (b) $\log(e^{2x}+1) - x + c$ (c) $\log(e^{2x}+1) + c$ (d) None of these

96. $\int \dfrac{e^{2x}+1}{e^{2x}-1}\,dx$ equals [Rajasthan PET 1996]

(a) $\log(e^x - e^{-x}) + c$ (b) $\log(e^x + e^{-x}) + c$ (c) $\log(e^{-x} - e^x) + c$ (d) $\log(1 - e^{-x}) + c$

97. $\int \dfrac{dx}{e^x + e^{-x}} =$ [Bihar CEE 1997; MNR 1974]

(a) $\tan^{-1}(e^{-x})$ (b) $\tan^{-1}(e^x)$ (c) $\log(e^x - e^{-x})$ (d) $\log(e^x + e^x)$

98. What is the value of the integral $I = \int \dfrac{dx}{(1 + e^x)(1 + e^{-x})}$ [DCE 1999]

(a) $\dfrac{-1}{1 + e^x}$ (b) $\dfrac{e^x}{1 + e^x}$ (c) $\dfrac{1}{1 + e^x}$ (d) None of these

99. $\int e^{3\log x}(x^4+1)^{-1}dx =$ **[MP PET 2001]**

(a) $\log(x^4+1)+c$ (b) $\frac{1}{4}\log(x^4+1)+c$ (c) $-\log(x^4+1)+c$ (d) None of these

100. $\int \frac{e^{\tan^{-1}x}}{1+x^2}dx =$ **[MP PET 1987]**

(a) $\log(1+x^2)-c$ (b) $\log e^{\tan^{-1}x}+c$ (c) $e^{\tan^{-1}x}+c$ (d) $\tan^{-1}e^{\tan^{-1}x}+c$

101. $\int \frac{e^{m\tan^{-1}x}}{1+x^2}dx$ equals to **[Rajasthan PET 2001]**

(a) $e^{\tan^{-1}x}$ (b) $\frac{1}{m}e^{\tan^{-1}x}$ (c) $\frac{1}{m}e^{m\tan^{-1}x}$ (d) None of these

102. $\int e^{\cos^2 x}\sin 2x\,dx =$ **[AI CBSE 1995]**

(a) $e^{\cos^2 x}+c$ (b) $-e^{\cos^2 x}+c$ (c) $\frac{1}{2}e^{\cos^2 x}+c$ (d) None of these

103. $\int e^x \sin(e^x)dx =$ **[MP PET 1995]**

(a) $-\cos e^x+c$ (b) $\cos e^x+c$ (c) $-\mathrm{cosec}\, e^x+c$ (d) None of these

104. $\int \frac{dx}{e^x-1} =$ **[MP PET 1989]**

(a) $\ln(1-e^{-x})+c$ (b) $-\ln(1-e^{-x})+c$ (c) $\ln(e^x-1)+c$ (d) None of these

105. The value of $\int \left(1+\frac{1}{x^2}\right)e^{\left(x-\frac{1}{x}\right)}dx$ equals **[Kurukshetra CEE 1998]**

(a) $e^{x-\frac{1}{x}}+c$ (b) $e^{x+\frac{1}{x}}+c$ (c) $e^{x^2-\frac{1}{x}}+c$ (d) $e^{x^2+\frac{1}{x^2}}+c$

106. $\int \frac{x^2}{\sqrt{1-x^3}}dx$ equals **[Rajasthan PET 1987]**

(a) $\frac{2}{3}\sqrt{1-x^3}+c$ (b) $\frac{-2}{3}\sqrt{1-x^3}+c$ (c) $\frac{1}{3}\sqrt{1-x^3}+c$ (d) $\frac{-1}{3}\sqrt{1-x^3}+c$

107. $\int \frac{x}{1+x^4}dx =$ **[IIT 1978; UPSEAT 2002]**

(a) $\frac{1}{2}\cot^{-1}x^2+c$ (b) $\frac{1}{2}\tan^{-1}x^2+c$ (c) $\cot^{-1}x^2+c$ (d) $\tan^{-1}x^2+c$

108. $\int \frac{3x^2}{x^6+1}dx =$ **[MNR 19981; MP PET 1988; Rajasthan PET 1995]**

(a) $\log(x^6+1)+c$ (b) $\tan^{-1}(x^3)+c$ (c) $3\tan^{-1}(x^3)+c$ (d) $3\tan^{-1}\left(\frac{x^3}{3}\right)+c$

109. $\int \frac{1}{\sqrt{1-e^{2x}}}dx =$ **[MP PET 1993, 2002; Rajasthan PET 1999]**

(a) $x-\log[1+\sqrt{1-e^{2x}}]+c$ (b) $x+\log[1+\sqrt{1-e^{2x}}]+c$ (c) $\log[1+\sqrt{1-e^{2x}}]-x+c$ (d) None of these

110. $\int \dfrac{\sec^2 x \, dx}{\sqrt{\tan^2 x + 4}} =$

(a) $\log\left[\tan x + \sqrt{\tan^2 x + 4}\right] + c$

(b) $\dfrac{1}{2}\log\left[\tan x + \sqrt{\tan^2 x + 4}\right] + c$

(c) $\log\left[\dfrac{1}{2}\tan x + \dfrac{1}{2}\sqrt{\tan^2 x + 4}\right] + c$

(d) None of these

111. $\int \cos x \sqrt{4 - \sin^2 x} \, dx =$

(a) $\dfrac{1}{2}\sin x \sqrt{4 - \sin^2 x} - 2 \sin^{-1}\left(\dfrac{1}{2}\sin x\right) + c$

(b) $\dfrac{1}{2}\sin x \sqrt{4 - \sin^2 x} + 2 \sin^{-1}\left(\dfrac{1}{2}\sin x\right) + c$

(c) $\dfrac{1}{2}\sin x \sqrt{4 - \sin^2 x} + \sin^{-1}\left(\dfrac{1}{2}\sin x\right) + c$

(d) None of these

112. $\int \dfrac{3x^2}{\sqrt{9 - 16x^6}} \, dx =$

(a) $\dfrac{1}{4}\sin^{-1}\left(\dfrac{4x^3}{3}\right) + c$

(b) $\dfrac{1}{3}\sin^{-1}\left(\dfrac{4x^3}{3}\right) + c$

(c) $\dfrac{1}{4}\sin^{-1} x^3 + c$

(d) $\dfrac{1}{3}\sin^{-1} x^3 + c$

113. $\int \dfrac{x}{\sqrt{4 - x^4}} \, dx =$ [Roorkee 1976]

(a) $\cos^{-1}\dfrac{x^2}{2}$

(b) $\dfrac{1}{2}\cos^{-1}\dfrac{x^2}{2}$

(c) $\sin^{-1}\dfrac{x^2}{2}$

(d) $\dfrac{1}{2}\sin^{-1}\dfrac{x^2}{2}$

114. $\dfrac{a^x}{\sqrt{1 - a^{2x}}} \, dx =$ [MNR 1983, 87]

(a) $\dfrac{1}{\log a}\sin^{-1} a^x + c$

(b) $\sin^{-1} a^x + c$

(c) $\dfrac{1}{\log a}\cos^{-1} a^x + c$

(d) $\cos^{-1} a^x + c$

115. $\int \dfrac{\sin x \, dx}{3 + 4\cos^2 x} =$ [Karnataka CET 2000]

(a) $\log(3 + 4\cos^2 x) + c$

(b) $\dfrac{-1}{2\sqrt{3}}\tan^{-1}\left(\dfrac{\cos x}{\sqrt{3}}\right) + c$

(c) $\dfrac{-1}{2\sqrt{3}}\tan^{-1}\left(\dfrac{2\cos x}{\sqrt{3}}\right) + c$

(d) $\dfrac{1}{2\sqrt{3}}\tan^{-1}\left(\dfrac{2\cos x}{\sqrt{3}}\right) + c$

116. $\int \dfrac{\sin 2x}{a^2 + b^2 \sin^2 x} \, dx =$ [Roorkee 1977]

(a) $\dfrac{1}{b^2}\log(a^2 + b^2 \sin^2 x) + c$

(b) $\dfrac{1}{b}\log(a^2 + b^2 \sin^2 x) + c$

(c) $\log(a^2 + b^2 \sin^2 x) + c$

(d) $b^2 \log(a^2 + b^2 \sin^2 x) + c$

117. $\int \dfrac{\sin x \cos x}{a \cos^2 x + b \sin^2 x} \, dx =$ [AI CBSE 1988, 89]

(a) $\dfrac{1}{2(b - a)}\log(a \cos^2 x + b \sin^2 x) + c$

(b) $\dfrac{1}{b - a}\log(a \cos^2 x + b \sin^2 x) + c$

(c) $\dfrac{1}{2}\log(a \cos^2 x + b \sin^2 x) + c$

(d) None of these

118. $\int \dfrac{1}{x\sqrt{1 + \log x}} \, dx$ [Roorkee 1997]

(a) $\dfrac{2}{3}(1 + \log x)^{3/2} + c$

(b) $(1 + \log x)^{3/2} + c$

(c) $2\sqrt{1 + \log x} + c$

(d) $\sqrt{1 + \log x} + c$

119. $\int \dfrac{dx}{x + x \log x} =$ [MP PET 1993; Roorkee1977]

(a) $\log(1 + \log x)$ (b) $\log \log(1 + \log x)$ (c) $\log x + \log(\log x)$ (d) None of these

120. $\int \dfrac{\sin 2x}{1 + \sin^2 x} dx =$ [Roorkee 1976]

(a) $\log \sin 2x + c$ (b) $\log(1 + \sin^2 x) + c$ (c) $\dfrac{1}{2} \log(1 + \sin^2 x) + c$ (d) $\tan^{-1}(\sin x) + c$

121. $\int \dfrac{\sec^2 x}{1 + \tan x} dx =$ [MP PET 1987]

(a) $\log(\cos x + \sin x) + c$ (b) $\log(\sec^2 x)$ (c) $\log(1 + \tan x)$ (d) $-\dfrac{1}{(1 + \tan x)^2}$

122. $\int \dfrac{\mathrm{cosec}^2 x}{1 + \cot x} dx =$ [MNR 1973]

(a) $\log(1 + \cot x) + c$ (b) $-\log(1 + \cot x) + c$ (c) $\dfrac{1}{2(1 + \cot x)^2} + c$ (d) None of these

123. $\int \dfrac{1}{\sqrt{x}} \sin \sqrt{x}\, dx =$ [MP PET 1989]

(a) $-\dfrac{1}{2} \cos \sqrt{x} + c$ (b) $-2 \cos \sqrt{x} + c$ (c) $\dfrac{1}{2} \cos \sqrt{x} + c$ (d) $2 \cos \sqrt{x} + c$

124. $\int \dfrac{x + 1}{\sqrt{1 + x^2}} dx =$ [MP PET 1991]

(a) $\sqrt{1 + x^2} + \tan^{-1} x + c$ (b) $\sqrt{1 + x^2} - \log\{x + \sqrt{1 + x^2}\} + c$

(c) $\sqrt{1 + x^2} + \log\{x + \sqrt{1 + x^2}\} + c$ (d) $\sqrt{1 + x^2} + \log(\sec x + \tan x) + c$

125. $\int \dfrac{3^x}{\sqrt{9^x - 1}} dx =$ [EAMCET 202]

(a) $\dfrac{1}{\log 3} \log|\, 3^x + \sqrt{9^x - 1}\,| + c$ (b) $\dfrac{1}{\log 3} \log|\, 9^x + \sqrt{9^x - 1}\,| + c$

(c) $\dfrac{1}{\log 9} \log|\, 3^x + \sqrt{9^x - 1}\,| + c$ (d) $\dfrac{1}{\log 9} \log|\, 3^x - \sqrt{9^x - 1}\,| + c$

126. To find the value of $\int \dfrac{1 + \log x}{x} dx$, the proper substitution is [MP PET 1988]

(a) $\log x = t$ (b) $1 + \log x = t$ (c) $\dfrac{1}{x} = t$ (d) None of these

127. $\int \dfrac{10x^9 + 10^x \log_e 10}{10^x + x^{10}} dx =$ [MNR 1979]

(a) $-\dfrac{1}{2} \dfrac{1}{(10^x + x^{10})^2}$ (b) $\log(10^x + x^{10}) + c$ (c) $\dfrac{1}{2} \dfrac{1}{(10^x + x^{10})^2} + c$ (d) None of these

128. $\int \dfrac{\sin x}{\sin(x - \alpha)} dx =$ [Rajasthan PET 1999; Kerala (Engg.) 2002]

(a) $x \cos \alpha - \sin \alpha \log \sin(x - \alpha) + c$ (b) $x \cos \alpha + \sin \alpha \log \sin(x - \alpha) + c$

(c) $x \sin \alpha - \sin \alpha \log \sin(x - \alpha) + c$ (d) None of these

129. $\int \dfrac{2x \tan^{-1} x^2}{1+x^4} dx =$ <div style="text-align:right">[Roorkee 1982]</div>

(a) $[\tan^{-1} x^2]^2 + c$ 　　(b) $\dfrac{1}{2}[\tan^{-1} x^2]^2 + c$ 　　(c) $2[\tan^{-1} x^2]^2 + c$ 　　(d) None of these

130. $\int \tan^{-1} \dfrac{2x}{1-x^2} dx =$ <div style="text-align:right">[MP PET 1991]</div>

(a) $x \tan^{-1} x + c$ 　　(b) $x \tan^{-1} x - \log(1+x^2) + c$ 　　(c) $2x \tan^{-1} x + \log(1+x^2) + c$ 　　(d) $2x \tan^{-1} x - \log(1+x^2) + c$

131. $\int \sin^{-1}(3x - 4x^3) dx =$ <div style="text-align:right">[AISSE 1986; DSSE 1984]</div>

(a) $x \sin^{-1} x + \sqrt{1-x^2} + c$ 　(b) $x \sin^{-1} x - \sqrt{1-x^2} + c$ 　(c) $2[x \sin^{-1} x + \sqrt{1-x^2}] + c$ 　(d) $3[x \sin^{-1} x + \sqrt{1-x^2}] + c$

132. The value of $\int \dfrac{2\,dx}{\sqrt{1-4x^2}}$ is <div style="text-align:right">[Karnataka CET 2001]</div>

(a) $\tan^{-1}(2x) + c$ 　　(b) $\cot^{-1}(2x) + c$ 　　(c) $\cos^{-1}(2x) + c$ 　　(d) $\sin^{-1}(2x) + c$

133. $\int \dfrac{\cot x}{\log \sin x} dx =$ <div style="text-align:right">[MNR 1974]</div>

(a) $\log(\log \sin x) + c$ 　　(b) $\log(\log \mathrm{cosec}\, x) + c$ 　　(c) $2\log(\log \sin x) + c$ 　　(d) None of these

134. If $\int f(x) dx = f(x)$, then $\int [f(x)]^2 dx$ is <div style="text-align:right">[DCE 2002]</div>

(a) $\dfrac{1}{2}[f(x)]^2$ 　　(b) $[f(x)]^3$ 　　(c) $\dfrac{[f(x)]^3}{3}$ 　　(d) $[f(x)]^2$

135. Integral of $f(x) = \sqrt{1+x^2}$ with respect to x^2 is

(a) $\dfrac{2}{3}\dfrac{(1+x^2)^{3/2}}{x} + k$ 　　(b) $\dfrac{2}{3}(1+x^2)^{3/2} + k$ 　　(c) $\dfrac{2}{3}x(1+x^2)^{3/2} + k$ 　　(d) None of these

136. $\int \dfrac{d(x^2+1)}{\sqrt{x^2+2}}$ is equal to

(a) $2\sqrt{x^2+2} + k$ 　　(b) $\sqrt{x^2+2} + k$ 　　(c) $\dfrac{1}{(x^2+2)^{3/2}} + k$ 　　(d) None of these

137. $\int x \sec x^2 dx$ is equal to

(a) $\dfrac{1}{2}\log(\sec x^2 + \tan x^2) + k$ 　　(b) $\dfrac{x^2}{2}\log(\sec x^2 + \tan x^2) + k$

(c) $2\log(\sec x^2 + \tan x^2) + k$ 　　(d) None of these

138. $\int f'(ax+b)\{f(ax+b)\}^n dx$ is equal to

(a) $\dfrac{1}{n+1}\{f(ax+b)\}^{n+1} + c, \forall n \text{ except } n = -1$ 　　(b) $\dfrac{1}{n+1}\{f(ax+b)\}^{n+1} + c, \forall n$

(c) $\dfrac{1}{a(n+1)}\{f(ax+b)\}^{n+1} + c, \forall n \text{ except } n = -1$ 　　(d) $\dfrac{1}{a(n+1)}\{f(ax+b)\}^{n+1} + c, \forall n$

139. $\int \dfrac{\sin x - \cos x}{\sqrt{1-\sin 2x}} e^{\sin x} \cos x\, dx$ is equal to

(a) $e^{\sin x} + c$ 　　(b) $e^{\sin x - \cos x} + c$ 　　(c) $e^{\sin x + \cos x} + c$ 　　(d) $e^{\cos x - \sin x} + c$

140. $\int 5^{5^{5^x}} . 5^{5^x} . 5^x\, dx$ is equal to

(a) $\dfrac{5^{5^{5^x}}}{(\log 5)^3} + c$ 　　(b) $5^{5^{5^x}} (\log 5)^3 + c$ 　　(c) $\dfrac{5^{5^{5^x}}}{(\log 5)^3} + c$ 　　(d) None of these

141. If $\int \dfrac{2x}{\sqrt{1-4^x}}\,dx = k\sin^{-1}(2^x)+c,$ then k is equal to

(a) $\log 2$ 　　　　　(b) $\dfrac{1}{2}\log 2$ 　　　　　(c) $\dfrac{1}{2}$ 　　　　　(d) $\dfrac{1}{\log 2}$

142. $\int \dfrac{1}{\sqrt{\sin^3 x \cos x}}\,dx$ is equal to

(a) $\dfrac{-2}{\sqrt{\tan x}}+c$ 　　(b) $2\sqrt{\tan x}+c$ 　　(c) $\dfrac{2}{\sqrt{\tan x}}+c$ 　　(d) $-2\sqrt{\tan x}+c$

143. $\int \dfrac{\sec x\,dx}{\sqrt{\cos 2x}} =$

(a) $\sin^{-1}(\tan x)$ 　　(b) $\tan x$ 　　(c) $\cos^{-1}(\tan x)$ 　　(d) $\dfrac{\sin x}{\sqrt{\cos x}}$

144. $\int \dfrac{x\,dx}{1-x\cot x} =$

(a) $\log(\cos x - x\sin x)+c$ 　　(b) $\log(x\sin x - \cos x)+c$ 　　(c) $\log(\sin x - x\cos x)+c$ 　　(d) None of these

145. To evaluate $\int \dfrac{\sec^2 x}{(1+\tan x)(2+\tan x)}\,dx,$ the most suitable substitution is

(a) $1+\tan x = t$ 　　(b) $2+\tan x = t$ 　　(c) $\tan x = t$ 　　(d) None of these

146. For which of the following functions, the substitution $x^2 = t$ is applicable

(a) $\int x^6 \tan^{-1} x^3\,dx$ 　　(b) $\int \tan^{-1}\left(\dfrac{2x}{1-x^2}\right)dx$ 　　(c) $\int x^3 \cos x^2\,dx$ 　　(d) None of these

147. $\int x\sqrt{\dfrac{1-x^2}{1+x^2}}\,dx =$

(a) $\dfrac{1}{2}[\sin^{-1} x^2 + \sqrt{1-x^4}]+c$ 　　　　　　　(b) $\dfrac{1}{2}[\sin^{-1} x^2 + \sqrt{1-x^2}]+c$

(c) $\sin^{-1} x^2 + \sqrt{1-x^4}+c$ 　　　　　　　(d) $\sin^{-1} x^2 + \sqrt{1-x^2}+c$

148. $\int \dfrac{1}{\cos^2 x(1-\tan x)^2}\,dx =$

(a) $\dfrac{1}{\tan x - 1}+c$ 　　(b) $\dfrac{1}{1-\tan x}+c$ 　　(c) $-\dfrac{1}{3}\dfrac{1}{(1-\tan x)^3}+c$ 　　(d) None of these

149. $\int \sec^p x \tan x\,dx =$

(a) $\dfrac{\sec^{p+1} x}{p+1}+c$ 　　(b) $\dfrac{\sec^p x}{p}+c$ 　　(c) $\int \dfrac{\tan^{p+1} x}{p+1}+c$ 　　(d) $\dfrac{\tan^p x}{p}+c$

<center>***Advance Level***</center>

150. Consider the following statements: 　　　　　　　　　　　　　　　　　　　**[SCRA 1996]**

Assertion (A): $\dfrac{1}{x^2+a^2}$ can be integrated by a substitution $x = a\tan\theta.$

Reason (R): Because all integrands are integrated by the method of substitution only.

Of these statements

(a) Both A and R are true and R is the correct explanation of A 　　　　　(b) Both A and R are true
but R is not the correct explanation of A

(c) A is true but R is false

(d) A is false but R is true

151. $\int \sqrt{\dfrac{a-x}{x}}\,dx =$

(a) $a\left[\text{in}^{-1}\sqrt{\dfrac{x}{a}}+\sqrt{\dfrac{x}{a}}\cdot\sqrt{\dfrac{a-x}{a}}\right]+C$

(b) $a\left[\sin^{-1}\sqrt{\dfrac{x}{a}}-\sqrt{\dfrac{x}{a}}\sqrt{\dfrac{a-x}{a}}\right]+C$

(c) $-a\left[\sin^{-1}\sqrt{\dfrac{x}{a}}+\sqrt{\dfrac{x}{a}}\sqrt{\dfrac{a-x}{a}}\right]+C$

(d) None of these

152. $\int \dfrac{\sin x}{\sin x - \cos x}\,dx =$ [Roorkee 1988]

(a) $\dfrac{1}{2}\log(\sin x - \cos x)+x+c$

(b) $\dfrac{1}{2}[\log(\sin x - \cos x)+x]+c$

(c) $\dfrac{1}{2}\log(\cos x - \sin x)+x+c$

(d) $\dfrac{1}{2}[\log(\cos x - \sin x)+x]+c$

153. $\int \dfrac{1+x^2}{\sqrt{1-x^2}}\,dx =$ [IIT 1977]

(a) $\dfrac{3}{2}\sin^{-1}x-\dfrac{1}{2}x\sqrt{1-x^2}+c$

(b) $\dfrac{3}{2}\sin^{-1}x+\dfrac{1}{2}x\sqrt{1-x^2}+c$

(c) $\dfrac{3}{2}\cos^{-1}x-\dfrac{1}{2}x\sqrt{1-x^2}+c$

(d) $\dfrac{3}{2}\cos^{-1}x+\dfrac{1}{2}x\sqrt{1-x^2}+c$

154. If $I=\int \sec^4 x\,\text{cosec}^2 x\,dx = K\tan^3 x + L\tan x + M\cot x + \text{constant}$, then

(a) $K=\dfrac{1}{3}, L=1, M=2$ (b) $K=\dfrac{1}{3}, L=2, M=-1$ (c) $K=-1, L=0, M=1$ (d) None of these

155. $\int \dfrac{\log(x+1)-\log x}{x(x+1)}\,dx =$

(a) $-\log\left(\dfrac{x+1}{x}\right)+c$

(b) $-\log\left[\log\left(\dfrac{x+1}{x}\right)\right]+c$

(c) $-\left(\dfrac{1}{2}\right)\left[\log\left(\dfrac{x+1}{x}\right)^2\right]+c$

(d) $c-\dfrac{1}{2}\left[(\log(x+1))^2-(\log x)^2\right]$

156. $\int \dfrac{dx}{\sqrt{1+\sin x}} =$

(a) $\sqrt{2}\log\tan(x/4+\pi/8)$

(b) $\sqrt{2}\log\left[\text{cosec}\,(x/2+\pi/4)-\cot(x/2+\pi/4)\right]$

(c) $\sqrt{2}\log\left[\sec\,(x/2-\pi/4)+\tan(x/2-\pi/4)\right]$

(d) All (a), (b) and (c)

157. $\int \dfrac{x+1}{x(1+xe^x)^2}\,dx = \log|1-f(x)|+f(x)+c$, then $f(x)=$

(a) $\dfrac{1}{x+e^x}$ (b) $\dfrac{1}{1+xe^x}$ (c) $\dfrac{1}{(1+xe^x)^2}$ (d) None of these

158. If $l^r(x)$ means $\log\log\log\ldots\ldots\log x$, the log being repeated r times, then $\int \dfrac{1}{xl(x)l^2(x)l^3(x)\ldots..l^r(x)}\,dx =$

(a) $l^{r+1}(x)+c$ (b) $\dfrac{l^{r+1}(x)}{r+1}+c$ (c) $l^r(x)+c$ (d) None of these

159. $\int x \sqrt{\left[\dfrac{2\sin(x^2-1)-\sin 2(x^2-1)}{2\sin(x^2-1)+\sin 2(x^2-1)}\right]} dx =$, (where $x^2-1 \neq n\pi$)

(a) $\log \dfrac{1}{2}\sec(x^2-1)$ (b) $\log \sec\left(\dfrac{x^2-1}{2}\right)$ (c) $\dfrac{1}{2}\log \sec(x^2-1)$ (d) None of these

160. $\int \cos\left\{2\tan^{-1}\sqrt{\dfrac{1-x}{1+x}}\right\} dx$ is equal to

(a) $\dfrac{1}{8}(x^2-1)+k$ (b) $\dfrac{1}{2}x^2+k$ (c) $\dfrac{1}{2}x+k$ (d) None of these

161. Let the equation of a curve passing through the point (0,1) be given by $y=\int x^2 . e^{x^3} dx$. If the equation of the curve is written in the form $x = f(y)$ then $f(y)$ is

(a) $\sqrt{\log_e(3y-2)}$ (b) $\sqrt[3]{\log_e(3y-2)}$ (c) $\sqrt[3]{\log_e(2-3y)}$ (d) None of these

162. $\int \sqrt{\dfrac{\cos x-\cos^3 x}{1-\cos^3 x}} dx$ is equal to

(a) $\dfrac{2}{3}\sin^{-1}(\cos^{3/2}x)+c$ (b) $\dfrac{3}{2}\sin^{-1}(\cos^{3/2}x)+c$ (c) $\dfrac{2}{3}\cos^{-1}(\cos^{3/2}x)+c$ (d) None of these

163. The value of $\int \dfrac{ax^2-b}{x\sqrt{c^2x^2-(ax^2+b)^2}} dx$ is

(a) $\sin^{-1}\left[\dfrac{ax+\dfrac{b}{x}}{c}\right]+k$ (b) $\sin^{-1}\left[\dfrac{ax^2+\dfrac{b}{x^2}}{c}\right]+k$ (c) $\cos^{-1}\left(\dfrac{ax+\dfrac{b}{x}}{c}\right)+k$ (d) $\cos^{-1}\left(\dfrac{ax^2+\dfrac{b}{x^2}}{c}\right)+k$

164. $\int \sqrt{\left(\dfrac{1-\sqrt{x}}{1+\sqrt{x}}\right)} dx =$ **[IIT 1985]**

(a) $\cos^{-1}\sqrt{x}+\sqrt{1-x}.(\sqrt{x}-2)+c$ (b) $\cos^{-1}\sqrt{x}-\sqrt{1-x}.(\sqrt{x}-2)+c$

(c) $\cos^{-1}\sqrt{x}+\sqrt{1-x}.(\sqrt{x}-2)+c$ (d) None of these

165. $\int \dfrac{\sin 2x}{\sin^4 x+\cos^4 x} dx =$ **[Rajasthan PET 1995]**

(a) $\cot^{-1}(\tan^2 x)+c$ (b) $\tan^{-1}(\tan^2 x)+c$ (c) $\cot^{-1}(\cot^2 x)+c$ (d) $\tan^{-1}(\cot^2 x)+c$

166. $\int \tan^3 2x \sec 2x\, dx =$ **[IIT 1977]**

(a) $\dfrac{1}{6}\sec^3 2x-\dfrac{1}{2}\sec 2x+c$ (b) $\dfrac{1}{6}\sec^3 2x+\dfrac{1}{2}\sec 2x+c$ (c) $\dfrac{1}{9}\sec^2 2x-\dfrac{1}{3}\sec 2x+c$ (d) None of these

167. The value of $\int \dfrac{\sqrt{(x^2-a^2)}}{x} dx$ will be **[UPSEAT 1999]**

(a) $\sqrt{(x^2-a^2)}-\tan^{-1}\left[\dfrac{\sqrt{(x^2-a^2)}}{a}\right]$ (b) $\sqrt{(x^2-a^2)}+\tan^{-1}\left[\dfrac{\sqrt{(x^2-a^2)}}{a}\right]$

(c) $\sqrt{(x^2-a^2)}+a^2\tan^{-1}\left[\sqrt{x^2-a^2}\right]$ (d) $\tan^{-1}\dfrac{x}{a}+c$

Basic Level

168. $\int (1 - x^2) \log x \, dx =$ [DSSE 1982]

(a) $\left(x - \dfrac{x^3}{3} \right) \log x - \left(x - \dfrac{x^3}{9} \right) + c$

(b) $\left(x - \dfrac{x^3}{3} \right) \log x + \left(x - \dfrac{x^3}{9} \right) + c$

(c) $\left(x + \dfrac{x^3}{3} \right) \log x + \left(x + \dfrac{x^3}{9} \right) + c$

(d) None of these

169. $\int \dfrac{1}{x^2} \log(x^2 + a^2) dx$ [MNR 1980]

(a) $\dfrac{1}{x} \log(x^2 + a^2) + \dfrac{2}{a} \tan^{-1} \dfrac{x}{a} + c$

(b) $-\dfrac{1}{x} \log(x^2 + a^2) + \dfrac{2}{a} \tan^{-1} \dfrac{x}{a} + c$

(c) $-\dfrac{1}{x} \log(x^2 + a^2) - \dfrac{2}{a} \tan^{-1} \dfrac{x}{a} + c$

(d) None of these

170. $\int \dfrac{\log x}{x^3} dx =$ [Roorkee 1986]

(a) $\dfrac{1}{4x^2}(2 \log x - 1) + C$
(b) $-\dfrac{1}{4x^2}(2 \log x + 1) + C$
(c) $\dfrac{1}{4x^2}(2 \log x + 1) + C$
(d) $\dfrac{1}{4x^2}(1 - 2 \log x) + C$

171. $\int x^3 \log x \, dx =$ [Karnataka CET 2002]

(a) $\dfrac{x^4 \log x}{4} + C$
(b) $\dfrac{1}{16}[4x^4 \log x - x^4] + C$
(c) $\dfrac{1}{8}[4x^4 \log x - 4x^2] + C$
(d) $\dfrac{1}{16}[4x^4 \log x + x^4] + C$

172. $\int x \sin^{-1} x \, dx =$ [MP PET 1991]

(a) $\left(\dfrac{x^2}{2} - \dfrac{1}{4} \right) \sin^{-1} x + \dfrac{x}{4} \sqrt{1 - x^2} + c$

(b) $\left(\dfrac{x^2}{2} + \dfrac{1}{4} \right) \sin^{-1} x + \dfrac{x}{4} \sqrt{1 - x^2} + c$

(c) $\left(\dfrac{x^2}{2} - \dfrac{1}{4} \right) \sin^{-1} x - \dfrac{x}{4} \sqrt{1 - x^2} + c$

(d) $\left(\dfrac{x^2}{2} + \dfrac{1}{4} \right) \sin^{-1} x - \dfrac{x}{4} \sqrt{1 - x^2} + c$

173. $\int \cos(\log_e x) dx$ is equal to [MP PET 2003]

(a) $\dfrac{1}{2} x \{ \cos(\log_e x) + \sin(\log_e x) \}$

(b) $x \{ \cos(\log_e x) + \sin(\log_e x) \}$

(c) $\dfrac{1}{2} x \{ \cos(\log_e x) - \sin(\log_2 x) \}$

(d) $x \{ \cos(\log_e x) - \sin(\log_e x) \}$

174. If $\int x e^{2x} dx$ is equal to $e^{2x} f(x) + c$ where c is constant of integration, then $f(x)$ is [UPSEAT 2001]

(a) $(3x - 1)/4$
(b) $(2x + 1)/2$
(c) $(2x - 1)/4$
(d) $(x - 4)/6$

175. $\int e^{2x} \left(\dfrac{\sin 4x - 2}{1 - \cos 4x} \right) dx =$ [Mathematics Olympiad 1986]

(a) $\dfrac{1}{2} e^{2x} \cot 2x + c$
(b) $-\dfrac{1}{2} e^{2x} \cot 2x + c$
(c) $-2 e^{2x} \cot 2x + c$
(d) $2 e^{2x} \cot 2x + c$

176. $\int x \cos x \, dx =$

(a) $x \sin x + \cos x$ (b) $x \sin x - \cos x$ (c) $x \cos x + \sin x$ (d) $x \cos x - \sin x$

177. $\int x \cos^2 x \, dx =$

(a) $\dfrac{x^4}{4} - \dfrac{1}{4} x \sin 2x - \dfrac{1}{8} \cos 2x + c$ (b) $\dfrac{x^4}{4} + \dfrac{1}{4} x \sin 2x + \dfrac{1}{8} \cos 2x + c$

(c) $\dfrac{x^4}{4} - \dfrac{1}{4} x \sin 2x + \dfrac{1}{8} \cos 2x + c$ (d) $\dfrac{x^4}{4} + \dfrac{1}{4} x \sin 2x - \dfrac{1}{8} \cos 2x + c$

178. If $\dfrac{d}{dx} f(x) = x \cos x + \sin x$ and $f(0) = 2$, then $f(x) =$

(a) $x \sin x$ (b) $x \cos x + \sin x + 2$ (c) $x \sin x + 2$ (d) $x \cos x + 2$

179. $\int e^{x/2} \sin\left(\dfrac{x}{2} + \dfrac{\pi}{4}\right) dx =$

(a) $e^{x/2} \cos \dfrac{x}{2} + c$ (b) $\sqrt{2}\, e^{x/2} \cos \dfrac{x}{2} + c$ (c) $e^{x/2} \sin \dfrac{x}{2} + c$ (d) $\sqrt{2}\, e^{x/2} \sin \dfrac{x}{2} + c$

180. $\int x \sin^2 x \, dx =$

(a) $\dfrac{x^2}{4} + \dfrac{x}{4} \sin 2x + \dfrac{1}{8} \cos 2x + c$ (b) $\dfrac{x^2}{4} - \dfrac{x}{4} \sin 2x + \dfrac{1}{8} \cos 2x + c$

(c) $\dfrac{x^2}{4} + \dfrac{x}{4} \sin 2x - \dfrac{1}{8} \cos 2x + c$ (d) $\dfrac{x^2}{4} - \dfrac{x}{4} \sin 2x - \dfrac{1}{8} \cos 2x + c$

181. $\int \dfrac{x - \sin x}{1 - \cos x} dx =$

(a) $x \cot \dfrac{x}{2} + c$ (b) $-x \cot \dfrac{x}{2} + c$ (c) $\cot \dfrac{x}{2} + c$ (d) None of these

182. $\int x^2 \sin 2x \, dx =$

(a) $\dfrac{1}{2} x^2 \cos 2x + \dfrac{1}{2} x \sin 2x + \dfrac{1}{4} \cos 2x + c$ (b) $-\dfrac{1}{2} x^2 \cos 2x + \dfrac{1}{2} x \sin 2x + \dfrac{1}{4} \cos 2x + c$

(c) $\dfrac{1}{2} x^2 \cos 2x - \dfrac{1}{2} x \sin 2x + \dfrac{1}{4} \cos 2x + c$ (d) None of these

183. $\int \log x \, dx =$

(a) $x + x \log x + c$ (b) $x \log x - x + c$ (c) $x^2 \log x + c$ (d) $\dfrac{1}{x} \log x + x + c$

184. $\int \log_{10} x \, dx =$

(a) $x \log_{10} x + c$ (b) $x(\log_{10} x + \log_{10} e) + c$ (c) $\log_{10} x + c$ (d) $x(\log_{10} x - \log_{10} e) + c$

185. $\int \dfrac{\log x}{(1 + \log x)^2} dx =$

(a) $\dfrac{1}{1 + \log x} + c$ (b) $\dfrac{x}{(1 + \log x)^2} + c$ (c) $\dfrac{x}{1 + \log x} + c$ (d) $\dfrac{1}{(1 + \log x)^2} + c$

186. $\int \left[\dfrac{1}{\log x} - \dfrac{1}{(\log x)^2} \right] dx =$

(a) $\dfrac{1}{\log x} + c$ (b) $\dfrac{x}{\log x} + c$ (c) $\dfrac{x}{(\log x)^2}$ (d) None of these

187. $\int e^{2x}\sin 3x\,dx =$ [Pb. CET 1994]

(a) $\dfrac{e^{2x}}{13}(2\sin 3x + 3\cos 3x) + c$

(b) $\dfrac{e^{2x}}{13}(2\sin 3x - 3\cos 3x) + c$

(c) $\dfrac{e^{2x}}{13}(2\cos 3x + 3\sin 3x) + c$

(d) $\dfrac{e^{2x}}{13}(2\cos 3x - 3\sin 3x) + c$

188. If $I = \int e^{x}\sin 2x\,dx$, then for what value of K, $KI = e^{x}(\sin 2x - 2\cos 2x) + \text{const.}$ [MP PET 1992]

(a) 1   (b) 3   (c) 5   (d) 7

189. If $\int g(x)dx = g(x)$, then $\int g(x)\{f(x) + f'(x)\}dx$ is equal to

(a) $g(x)f(x) - g(x)f'(x) + c$

(b) $g(x)f'(x) + c$

(c) $g(x)f(x) + c$

(d) $g(x)f^{2}(x) + c$

190. The primitive of the function $x|\cos x|$ when $\dfrac{\pi}{2} < x < \pi$ is given by

(a) $\cos x + x\sin x$ (b) $-\cos x - x\sin x$ (c) $x\sin x - \cos x$ (d) None of these

191. $\int \log(x+1)dx =$ [Roorkee 1974]

(a) $(x+1)\log(x+1) - x + c$ (b) $(x+1)\log(x+1) + x + c$ (c) $(x-1)\log(x+1) - x + c$ (d) None of these

192. $\int \dfrac{1}{\log_x e}\,dx =$ [MP PET 1994]

(a) $\log\log_x e + c$ (b) $\dfrac{1}{(\log_x e)^2} + c$ (c) $x\log\left(\dfrac{x}{e}\right) + c$ (d) None of these

193. $\int (\log x)^2 dx =$ [IIT 1971, 77]

(a) $x(\log x)^2 - 2x\log x - 2x + c$

(b) $x(\log x)^2 - 2x\log x - x + c$

(c) $x(\log x)^2 - 2x\log x + 2x + c$

(d) $x(\log x)^2 - 2x\log x + x + c$

194. $\int x\log x\,dx =$ [MP PET 1987]

(a) $\dfrac{x^2}{2}\log x - \dfrac{x^2}{2} + c$ (b) $\dfrac{x^2}{2}\log x - \dfrac{x^2}{4} + c$ (c) $\dfrac{x^2}{2}\log x + \dfrac{x^2}{2} + c$ (d) None of these

195. If $\int \ln(x^2 + x)dx = x\,\ln(x^2 + x) + A$, then $A =$ [MP PET 1992]

(a) $2x + \ln(x+1) + \text{const.}$ (b) $2x - \ln(x+1) + \text{const.}$ (c) Constant   (d) None of these

196. The value of $\int \dfrac{\log x}{(x+1)^2}\,dx$ is [UPSEAT 1999]

(a) $\dfrac{-\log x}{x+1} + \log x - \log(x+1)$

(b) $\dfrac{\log x}{x+1} + \log x - \log(x+1)$

(c) $\dfrac{\log x}{x+1} - \log x - \log(x+1)$

(d) $\dfrac{-\log x}{x+1} - \log x - \log(x+1)$

197. $\int \tan^{-1} x\,dx =$ [Roorkee 1977]

(a) $x\tan^{-1}x + \dfrac{1}{2}\log(1+x^2)$ (b) $x\tan^{-1}x - \dfrac{1}{2}\log(1+x^2)$ (c) $(x-1)\tan^{-1}x$ (d) $x\tan^{-1}x - \log(1+x^2)$

198. $\int x \tan^{-1} x dx =$

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

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

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

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

199. $\int e^x(1+\tan x)\sec x dx =$

(a) $e^x \cot x$

(b) $e^x \tan x$

(c) $e^x \sec x$

(d) $e^x \cos x$

200. $\int e^x\left[\sin^{-1}\frac{x}{a} + \frac{1}{\sqrt{a^2-x^2}}\right]dx =$

(a) $\frac{1}{a} e^x \sin^{-1}\frac{x}{a} + c$

(b) $ae^x \sin^{-1}\frac{x}{a} + c$

(c) $e^x \sin^{-1}\frac{x}{a} + c$

(d) $\frac{e^x}{\sqrt{a^2-x^2}} + c$

201. $\int e^x \sin x(\sin x + 2\cos x)dx =$

(a) $e^x \sin^2 x + c$

(b) $e^x \sin x + c$

(c) $e^x \sin 2x$

(d) None of these

202. $\int e^x\left(\frac{1}{x} - \frac{1}{x^2}\right)dx =$

(a) $-\frac{e^x}{x^2} + c$

(b) $\frac{e^x}{x^2} + c$

(c) $\frac{e^x}{x} + c$

(d) $-\frac{e^x}{x} + c$

203. $\int e^x[f(x)+f'(x)]dx$ is equal to

(a) $e^x f(x)$

(b) e^x

(c) $e^x f'(x)$

(d) None of these

204. $\int\left(\frac{x+2}{x+4}\right)e^x dx$ is equal to

(a) $e^x\left(\frac{x}{x+4}\right) + C$

(b) $e^x\left(\frac{x+2}{x+4}\right) + C$

(c) $e^x\left(\frac{x-2}{x+4}\right) + C$

(d) $\left(\frac{2xe^x}{x+4}\right) + C$

205. $\int\frac{x-1}{(x+1)^3} e^x dx =$

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

(b) $\frac{e^x}{(x+1)^2} + c$

(c) $\frac{e^x}{(x+1)^3} + c$

(d) $\frac{-e^x}{(x+1)^3} + c$

206. $\int\frac{xe^x}{(1+x)^2}dx =$

(a) $\frac{e^{-x}}{1+x} + C$

(b) $-\frac{e^{-x}}{1+x} + c$

(c) $\frac{e^x}{1+x} + c$

(d) $-\frac{e^x}{1+x} + c$

207. $\int e^x\frac{(x^2+1)}{(x+1)^2}dx =$

(a) $\left(\frac{x-1}{x+1}\right)e^x + c$

(b) $e^x\left(\frac{x+1}{x-1}\right) + c$

(c) $e^x(x+1)(x-1) + c$

(d) None of these

208. The value of $\int e^{2x}(2\sin 3x + 3\cos 3x)dx$ is

(a) $e^{2x} \sin 3x$

(b) $e^{2x} \cos 3x$

(c) e^{2x}

(d) $e^{2x}(2\sin 3x)$

209. $\int e^x \cdot \left(\dfrac{1+\sin x}{1+\cos x}\right)dx$ is equal to

(a) $e^x \cdot \tan\left(\dfrac{x}{2}\right) + C$ (b) $e^x \cdot \cot\left(\dfrac{x}{2}\right) + C$ (c) $e^x \cdot \tan x + C$ (d) $e^x \cdot \cot x + C$

210. $\int e^x \cdot (1 + \tan x + \tan^2 x)dx =$

(a) $e^x \sin x + C$ (b) $e^x \cos x + C$ (c) $e^x \tan x + C$ (d) $e^x \sec x + C$

211. $\int (1 + x - x^{-1})e^{x+x^{-1}}dx =$

(a) $(x+1)e^{x+x^{-1}} + C$ (b) $(x-1)e^{x+x^{-1}} + C$ (c) $-xe^{x+x^{-1}} + C$ (d) $xe^{x+x^{-1}} + C$

212. $\int e^{-x}(1 - \tan x)\sec x\, dx$ is equal to

(a) $e^{-x} \sec x + C$ (b) $e^{-x} \tan x + C$ (c) $-e^{-x} \tan x + C$ (d) None of these

213. Let $\int e^x \{f(x) - f'(x)\}dx = \phi(x)$ Then $\int e^x f(x)dx$ is

(a) $\phi(x) + e^x f(x)$ (b) $\phi(x) - e^x f(x)$ (c) $\dfrac{1}{2}\{\phi(x) + e^x f(x)\}$ (d) $\dfrac{1}{2}\{\phi(x) + e^x f'(x)\}$

214. If $\int f(x)dx = g(x),$ then $\int f^{-1}(x)dx$ is equal to

(a) $g^{-1}(x)$ (b) $xf^{-1}(x) - g(f^{-1}(x))$ (c) $xf^{-1}(x) - g^{-1}(x)$ (d) $f^{-1}(x)$

215. $\int \sin \sqrt{x}\, dx =$

(a) $2[\sin \sqrt{x} - \cos \sqrt{x}] + c$ (b) $2[\sin \sqrt{x} - \sqrt{x} \cos \sqrt{x}] + c$ (c) $2[\sin \sqrt{x} + \cos \sqrt{x}] + c$ (d) $2[\sin \sqrt{x} + \sqrt{x} \cos \sqrt{x}] + c$

216. $\int \cos \sqrt{x}\, dx =$

(a) $2[\sqrt{x} \sin \sqrt{x} + \cos \sqrt{x}] + c$ (b) $2[\sqrt{x} \sin \sqrt{x} - \cos \sqrt{x}] + c$ (c) $2[\cos \sqrt{x} - \sqrt{x} \sin \sqrt{x}] + c$ (d) $-2[\sqrt{x} \sin \sqrt{x} + \cos \sqrt{x}] + c$

217. $\int \dfrac{x \sin^{-1} x}{\sqrt{1-x^2}}dx =$

(a) $x - \sqrt{1-x^2} \sin^{-1} x + c$ (b) $x + \sqrt{1-x^2} \sin^{-1} x + c$ (c) $\sqrt{1-x^2} \sin^{-1} x - x + c$ (d) None of these

218. $\int \dfrac{x \tan^{-1} x\, dx}{(1+x^2)^{3/2}}$

(a) $\dfrac{x + \tan^{-1} x}{\sqrt{1+x^2}} + c$ (b) $\dfrac{x - \tan^{-1} x}{\sqrt{1+x^2}} + c$ (c) $\dfrac{\tan^{-1} x - x}{\sqrt{1+x^2}} + c$ (d) None of these

Advance Level

219. $\int [\sin(\log x) + \cos(\log x)]dx =$

(a) $x \cos(\log x) + c$ (b) $\sin(\log x) + c$ (c) $\cos(\log x) + c$ (d) $x \sin(\log x) + c$

220. $\int \cos 2\theta \log\left(\dfrac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta}\right) d\theta =$ **[IIT 1994]**

(a) $(\cos \theta - \sin \theta)^2 \log\left(\dfrac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta}\right)$

(b) $(\cos \theta + \sin \theta)^2 \log\left(\dfrac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta}\right)$

(c) $\dfrac{(\cos \theta - \sin \theta)^2}{2} \log\left(\dfrac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta}\right)$

(d) $\dfrac{1}{2} \sin 2\theta \log \tan\left(\dfrac{\pi}{4} + \theta\right) - \dfrac{1}{2} \log \sec 2\theta$

221. $\int \left[\log(\log x) + \dfrac{1}{(\log x)^2}\right] dx =$

(a) $x \log(\log x) + \dfrac{x}{\log x} + c$

(b) $x \log(\log x) - \dfrac{x}{\log x} + c$

(c) $x \log(\log x) + \dfrac{\log x}{x} + c$

(d) $x \log(\log x) - \dfrac{\log x}{x} + c$

222. If $f(x) = \begin{vmatrix} 0 & x^2 - \sin x & \cos x - 2 \\ \sin x - x^2 & 0 & 1 - 2x \\ 2 - \cos x & 2x - 1 & 0 \end{vmatrix}$, then $\int f(x) dx$ is equal to

(a) $\dfrac{x^3}{3} - x^2 \sin x + \sin 2x$

(b) $\dfrac{x^3}{3} - x^2 \sin x - \cos 2x$

(c) $\dfrac{x^3}{3} - x^2 \cos x + \cos 2x$

(d) Constant

223. If integral of $\dfrac{2 \sin x - \sin 2x}{x^3}$ $(x \neq 0)$ is $g(x)$, then $\lim\limits_{x \to 0} g'(x)$ will be equal to

(a) 1   (b) -1   (c) 0   (d) None of these

224. The value of $\int e^{\sec x} . \sec^3 x (\sin^2 x + \cos x + \sin x + \sin x \cos x) dx$ is

(a) $e^{\sec x}(\sec^2 x + \sec x . \tan x) + c$

(b) $e^{\sec x} + c$

(c) $e^{\sec x}(\sec x + \tan x) + c$

(d) None of these

225. $\int e^{\tan^{-1} x}\left(1 + \dfrac{x}{1 + x^2}\right) dx$ is equal to

(a) $x.e^{\tan^{-1} x}$

(b) $\dfrac{1}{2} xe^{\tan^{-1} x}$

(c) $e^{\tan^{-1} x}$

(d) $\dfrac{1}{2} e^{\tan^{-1} x}$

226. $\int \sin 2x . \log \cos x\, dx$ is equal to

(a) $\cos^2 x\left(\dfrac{1}{2} + \log \cos x\right) + k$

(b) $\cos^2 x . \log x + k$

(c) $\cos^2 x\left(\dfrac{1}{2} - \log \cos x\right) + k$

(d) None of these

227. If $\int x \log(1 + x^2) dx = \phi(x) . \log(1 + x^2) + \psi(x) + c$ then

(a) $\phi(x) = \dfrac{1 + x^2}{2}$

(b) $\psi(x) = \dfrac{1 + x^2}{2}$

(c) $\psi(x) = -\dfrac{1 + x^2}{2}$

(d) $\phi(x) = -\dfrac{1 + x^2}{2}$

228. If $\int \dfrac{x \tan^{-1} x}{\sqrt{1 + x^2}} dx = \sqrt{1 + x^2} f(x) + A \log(x + \sqrt{x^2 + 1}) + c$, then

(a) $f(x) = \tan^{-1} x, A = -1$

(b) $f(x) = \tan^{-1} x, A = 1$

(c) $f(x) = 2 \tan^{-1} x, A = -1$

(d) $f(x) = 2 \tan^{-1} x, A = 1$

229. $\int \dfrac{\sqrt{x^2+1}\,[\log(x^2+1)-2\log x]}{x^4}\,dx$ is equal to

(a) $\dfrac{1}{3}\left(1+\dfrac{1}{x^2}\right)^{\frac{1}{2}}\left[\log\left(1+\dfrac{1}{x^2}\right)+\dfrac{2}{3}\right]+c$

(b) $-\dfrac{1}{3}\left(1+\dfrac{1}{x^2}\right)^{\frac{3}{2}}\left[\log\left(1+\dfrac{1}{x^2}\right)-\dfrac{2}{3}\right]+c$

(c) $\dfrac{2}{3}\left(1+\dfrac{1}{x^2}\right)^{\frac{3}{2}}\left[\log\left(1+\dfrac{1}{x^2}\right)+\dfrac{2}{3}\right]+c$

(d) None of these

230. If $\int x\log(1+\dfrac{1}{x})dx = f(x).\log(x+1)+g(x).x^2+Ax+c$, then

(a) $f(x)=\dfrac{1}{2}x^2$

(b) $g(x)=\log x$

(c) $A=1$

(d) None of these

231. If $\int \dfrac{xe^x}{\sqrt{1+e^x}}dx = f(x)\sqrt{1+e^x}-2\log g(x)+c$, then

(a) $f(x)=x-1$

(b) $g(x)=\dfrac{\sqrt{1+e^x}-1}{\sqrt{1+e^x}+1}$

(c) $g(x)=\dfrac{\sqrt{1+e^x}+1}{\sqrt{1+e^x}-1}$

(d) $f(x)=2(x-2)$

232. $\int \dfrac{\sin^{-1}x}{(1-x^2)^{\frac{3}{2}}}dx =$ **[AISSE 1983, 87]**

(a) $\dfrac{x}{\sqrt{(1-x^2)}}\sin^{-1}x+\dfrac{1}{2}\log(1-x^2)+c$

(b) $\dfrac{x}{\sqrt{(1-x^2)}}\sin^{-1}x-\dfrac{1}{2}\log(1-x^2)+c$

(c) $\dfrac{1}{\sqrt{(1-x^2)}}\sin^{-1}x-\dfrac{1}{2}\log(1-x^2)+c$

(d) $\dfrac{1}{\sqrt{(1-x^2)}}\sin^{-1}x+\dfrac{1}{2}\log(1-x^2)+c$

233. If $\int f(x)dx = F(x),$ then $\int x^3 f(x^2)dx$ is equal to

(a) $\dfrac{1}{2}\left[x^2 F(x^2)-\int F(x^2)\,d\,(x^2)\right]$

(b) $\dfrac{1}{2}\left[x^2 F(x^2)-\int F(x^2)\,dx\right]$

(c) $\dfrac{1}{2}\left[x^2 F(x)-\dfrac{1}{2}\int F(x^2)\,dx\right]$

(d) None of these

Evaluation of the Various forms of Integrals by use of Standard Results

Basic Level

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234. $\int \dfrac{dx}{x^2+4x+13}$ is equal to **[Kerala CET 2002]**

(a) $\log(x^2+4x+13)+c$

(b) $\dfrac{1}{3}\tan^{-1}\left(\dfrac{x+2}{3}\right)+c$

(c) $\log(2x+4)+c$

(d) $\dfrac{2x+4}{(x^2+4x+13)^2}+c$

235. $\int \dfrac{dx}{x^2+8x+20} =$ **[Pb. CET 1996]**

(a) $\tan^{-1}\left(\dfrac{x+4}{2}\right)+c$

(b) $\dfrac{1}{2}\tan^{-1}\left(\dfrac{x+4}{2}\right)+c$

(c) $-\tan^{-1}\left(\dfrac{x+4}{2}\right)+c$

(d) $-\dfrac{1}{2}\tan^{-1}\left(\dfrac{x+4}{2}\right)+c$

236. $\int \dfrac{dx}{1+x-x^2} =$

(a) $\dfrac{1}{\sqrt{5}} \log\left[\dfrac{\sqrt{5}-1+2x}{\sqrt{5}+1-2x}\right] + c$

(b) $\dfrac{1}{\sqrt{5}} \log\left[\dfrac{\sqrt{5}-1-2x}{\sqrt{5}+1+2x}\right] + c$

(c) $-\dfrac{1}{\sqrt{5}} \log\left[\dfrac{\sqrt{5}-1+2x}{\sqrt{5}+1-2x}\right] + c$

(d) $-\dfrac{1}{\sqrt{5}} \log\left[\dfrac{\sqrt{5}-1-2x}{\sqrt{5}+1+2x}\right] + c$

237. The value of $\int \dfrac{dx}{3-2x-x^2}$ will be   **[UPSEAT 1999]**

(a) $\dfrac{1}{4}\log\left(\dfrac{3+x}{1-x}\right)$

(b) $\dfrac{1}{3}\log\left(\dfrac{3+x}{1-x}\right)$

(c) $\dfrac{1}{2}\log\left(\dfrac{3+x}{1-x}\right)$

(d) $\log\left(\dfrac{1-x}{3+x}\right)$

238. If $\int \dfrac{2x+3}{x^2-5x+6}\,dx = 9\ln(x-3)-7\ln(x-2)+A,$ then $A =$

(a) $5\ln(x-2)+\text{constant}$

(b) $-4\ln(x-3)+\text{constant}$

(c) Constant

(d) None of these

239. $\int \dfrac{x\,dx}{x^2+4x+5}$ **[Rajasthan PET 2002]**

(a) $\dfrac{1}{2}\log(x^2+4x+5)+2\tan^{-1}x+c$

(b) $\dfrac{1}{2}\log(x^2+4x+5)-\tan^{-1}(x+2)+c$

(c) $\dfrac{1}{2}\log(x^2+4x+5)+\tan^{-1}(x+2)+c$

(d) $\dfrac{1}{2}\log(x^2+4x+5)-2\tan^{-1}(x+2)+c$

240. $\int \dfrac{2x-3}{x^2+3x-18}\,dx =$

(a) $\log|x^2+3x-18| - \dfrac{2}{3}\log\left|\dfrac{x-3}{x+6}\right| + c$

(b) $\log|x^2+3x-18| + \dfrac{2}{3}\log\left|\dfrac{x-3}{x+6}\right| + c$

(c) $-\log|x^2+3x-18| - \dfrac{2}{3}\log\left|\dfrac{x-3}{x+6}\right| + c$

(d) $-\log|x^2+3x-18| + \dfrac{2}{3}\log\left|\dfrac{x-3}{x+6}\right| + c$

241. $\int \sqrt{x^2-8x+7}\,dx =$

(a) $\dfrac{1}{2}(x-4)\sqrt{x^2-8x+7} + 9\log[x-4+\sqrt{x^2-8x+7}] + c$

(b) $\dfrac{1}{2}(x-4)\sqrt{x^2-8x+7} - 3\sqrt{2}\log[x-4+\sqrt{x^2-8x+7}] + c$

(c) $\dfrac{1}{2}(x-4)\sqrt{x^2-8x+7} - \dfrac{9}{2}\log[x-4+\sqrt{x^2-8x+7}] + c$

(d) None of these

242. $\int \dfrac{dx}{\sqrt{2x-x^2}} =$ **[MP PET 1991; Karnataka CET 2002]**

(a) $\cos^{-1}(x-1)+c$

(b) $\sin^{-1}(x-1)+c$

(c) $\cos^{-1}(1+x)+c$

(d) $\sin^{-1}(1-x)+c$

243. $\int \dfrac{x^4+x^2+1}{x^2-x+1}dx =$

(a) $\dfrac{1}{3}x^3+\dfrac{1}{2}x^2+x+c$

(b) $\dfrac{1}{3}x^3-\dfrac{1}{2}x^2+x+c$

(c) $\dfrac{1}{3}x^3+\dfrac{1}{2}x^2-x+c$

(d) None of these

244. $\displaystyle\int \frac{dx}{x[(\log x)^2 + 4\log x - 1]} =$

(a) $\dfrac{1}{2\sqrt 5}\log\left[\dfrac{\log x + 2 - \sqrt 5}{\log x + 2 + \sqrt 5}\right] + c$

(b) $\dfrac{1}{\sqrt 5}\log\left[\dfrac{\log x + 2 - \sqrt 5}{\log x + 2 + \sqrt 5}\right] + c$

(c) $\dfrac{1}{2\sqrt 5}\log\left[\dfrac{\log x + 2 + \sqrt 5}{\log x + 2 - \sqrt 5}\right] + c$

(d) $\dfrac{1}{\sqrt 5}\log\left[\dfrac{\log x + 2 + \sqrt 5}{\log x + 2 - \sqrt 5}\right] + c$

245. $\displaystyle\int \frac{dx}{7 + 5\cos x} =$ 　　　　　　　　　　　　　　　　　　　　　　　**[EAMCET 2002]**

(a) $\dfrac{1}{\sqrt 6}\tan^{-1}\left(\dfrac{1}{\sqrt 6}\tan\dfrac{x}{2}\right) + c$

(b) $\dfrac{1}{\sqrt 3}\tan^{-1}\left(\dfrac{1}{\sqrt 3}\tan\dfrac{x}{2}\right) + c$

(c) $\dfrac{1}{4}\tan^{-1}\left(\tan\dfrac{x}{2}\right) + c$

(d) $\dfrac{1}{7}\tan^{-1}\left(\tan\dfrac{x}{2}\right) + c$

246. $\displaystyle\int \frac{dx}{\sin x + \sqrt 3\cos x} =$

(a) $\log\tan\left(\dfrac{x}{2} + \dfrac{\pi}{2}\right) + c$ 　　(b) $\dfrac{1}{2}\log\tan\left(\dfrac{x}{2} + \dfrac{\pi}{6}\right) + c$ 　　(c) $\log\cot\left(\dfrac{x}{2} + \dfrac{\pi}{6}\right) + c$ 　　(d) $\dfrac{1}{2}\log\cot\left(\dfrac{x}{2} + \dfrac{\pi}{6}\right) + c$

247. $\displaystyle\int \frac{dx}{1 - \sin x + \cos x} =$ 　　　　　　　　　　　　　　　　　　　　　**[Pb. CET 1992]**

(a) $\log\left|1 - \tan\dfrac{x}{2}\right| + c$ 　　(b) $-\log\left|1 - \tan\dfrac{x}{2}\right| + c$ 　　(c) $\log\left|1 + \tan\dfrac{x}{2}\right| + c$ 　　(d) None of these

248. $\displaystyle\int \frac{dx}{\sin x - \cos x + \sqrt 2}$ equals 　　　　　　　　　　　　　　　　　　**[MP PET 2002]**

(a) $-\dfrac{1}{\sqrt 2}\tan\left(\dfrac{x}{2} + \dfrac{\pi}{8}\right) + c$ 　(b) $\dfrac{1}{\sqrt 2}\tan\left(\dfrac{x}{2} + \dfrac{\pi}{8}\right) + c$ 　(c) $\dfrac{1}{\sqrt 2}\cot\left(\dfrac{x}{2} + \dfrac{\pi}{8}\right) + c$ 　(d) $-\dfrac{1}{\sqrt 2}\cot\left(\dfrac{x}{2} + \dfrac{\pi}{8}\right) + c$

249. $\displaystyle\int \frac{dx}{1 + 2\sin x + \cos x} =$ 　　　　　　　　　　　　　　　　　　　**[Rajasthan PET 1991]**

(a) $\log[1 + 2\tan(x/2)] + c$ 　(c) $\log[1 - 2\tan(x/2)] + c$ 　(c) $\dfrac{1}{2}\log[1 + 2\tan(x/2)] + c$ 　(d) None of these

250. $\displaystyle\int \frac{c^2\sin 2x}{a^2 + b^2\sin^2 x}\,dx =$

(a) $\dfrac{c^2}{b^2}\log(a^2 + b^2\sin^2 x) + k$ (b) $\dfrac{c^2}{a^2}\log(a^2 + b^2\sin^2 x) + k$ 　(c) $\dfrac{b^2}{c^2}\log(a^2 + b^2\sin^2 x) + k$ 　(d) None of these

251. $\displaystyle\int \frac{1}{1 + \sin^2 x}\,dx =$

(a) $\dfrac{1}{\sqrt 2}\tan^{-1}(\sqrt 2\tan x) + k$ 　(b) $\sqrt 2\tan^{-1}(\sqrt 2\tan x) + k$ 　(c) $-\dfrac{1}{\sqrt 2}\tan^{-1}(\sqrt 2\tan x) + k$ 　(d) $-\sqrt 2\tan^{-1}(\sqrt 2\tan x) + k$

252. $\displaystyle\int \frac{1}{1 + \cos^2 x}\,dx =$

(a) $\dfrac{1}{\sqrt 2}\tan^{-1}(\tan x) + c$ 　(b) $\dfrac{1}{\sqrt 2}\tan^{-1}\left(\dfrac{1}{2}\tan x\right) + c$ 　(c) $\dfrac{1}{\sqrt 2}\tan^{-1}\left(\dfrac{1}{\sqrt 2}\tan x\right) + c$ 　(d) None of these

253. $\displaystyle\int \frac{dx}{(a\sin x + b\cos x)^2} =$

(a) $\dfrac{1}{a(a\tan x+b)}+c$

(b) $\dfrac{-1}{a(a\tan x+b)}+c$

(c) $\dfrac{1}{a\tan x+b}+c$

(d) $\dfrac{-1}{a\tan x+b}+c$

254. $\displaystyle\int \frac{2\sin x + 3\cos x}{4\sin x + 5\cos x}\,dx$

(a) $\dfrac{2}{41}\log|5\cos x+4\sin x|+\dfrac{23}{41}x+c$

(b) $\dfrac{1}{2}\log|\sin x-\cos x|+\dfrac{1}{2}x+c$

(c) $\dfrac{2}{13}\log|2\sin x+3\cos x|+\dfrac{3}{13}x+c$

(d) $\dfrac{1}{2}\log|\sin x+\cos x|+\dfrac{1}{2}x+c$

255. $\displaystyle\int \frac{dx}{1-\tan x} =$ **[Pb. CET 1991, 93]**

(a) $\dfrac{1}{2}x-\dfrac{1}{2}\log|\cos x-\sin x|+c$

(b) $\dfrac{1}{2}x+\dfrac{1}{2}\log|\cos x+\sin x|+c$

(c) $\dfrac{1}{2}x+\dfrac{1}{2}\log|\cos x-\sin x|+c$

(d) None of these

256. $\displaystyle\int \frac{dx}{\cos x-\sin x}$ is equal to   **[AIEEE 2004]**

(a) $\dfrac{1}{\sqrt{2}}\log\left|\tan\left(\dfrac{x}{2}+\dfrac{3\pi}{8}\right)\right|+c$ (b) $\dfrac{1}{\sqrt{2}}\log\left|\cot\left(\dfrac{x}{2}\right)\right|+c$

(c) $\dfrac{1}{\sqrt{2}}\log\left|\tan\left(\dfrac{x}{2}-\dfrac{3\pi}{8}\right)\right|+c$

(d) $\dfrac{1}{\sqrt{2}}\log\left|\tan\left(\dfrac{x}{2}-\dfrac{\pi}{8}\right)\right|+c$

257. $\displaystyle\int \frac{3\sin x + 2\cos x}{3\cos x + 2\sin x}\,dx =$

(a) $\dfrac{12}{13}x-\dfrac{5}{13}\log(3\cos x+2\sin x)$

(b) $\dfrac{12}{13}x+\dfrac{5}{13}\log(3\cos x+2\sin x$

(c) $\dfrac{13}{12}x+\dfrac{5}{13}\log(3\cos x+2\sin x$

(d) None of these

258. $\displaystyle\int \frac{6x+7}{\sqrt{(x-5)(x-4)}}\,dx =$

(a) $6\sqrt{x^2-9x+20}+34\log\left|x-\dfrac{9}{2}+\sqrt{x^2-9x+20}\right|+c$

(b) $6\sqrt{x^2+9x+20}+34\log\left|x-\dfrac{9}{2}+\sqrt{x^2+9x+20}\right|+c$

(c) $6\sqrt{x^2-9x+20}-34\log\left|x-\dfrac{9}{2}+\sqrt{x^2-9x+20}\right|+c$

(d) $6\sqrt{x^2+9x+20}-34\log\left|x-\dfrac{9}{2}+\sqrt{x^2+9x+20}\right|+c$

Advance Level

259. The integral $\displaystyle\int \frac{2x-3}{(x^2+x+1)^2}\,dx$ is equal to

(a) $-\dfrac{8x+7}{3(x^2+x+1)}-\dfrac{16}{3\sqrt{3}}\tan^{-1}\left(\dfrac{2x+1}{\sqrt{3}}\right)+c$

(b) $-\dfrac{1}{x^2+x+1}-\dfrac{4}{3}\tan^{-1}(4x+3)+c$

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

(d) $\dfrac{1}{4(x^2+x+1)}+\dfrac{2}{3}\tan^{-1}(2x+1)+c$

260. The value of the integral $\displaystyle\int \frac{1+x^2}{1+x^4}\,dx$ is equal to

(a) $\tan^{-1} x^2 + c$ (b) $\dfrac{1}{\sqrt{2}} \tan^{-1}\left(\dfrac{x^2-1}{\sqrt{2}x}\right)$ (c) $\dfrac{1}{2\sqrt{2}} \log\left(\dfrac{x^2+\sqrt{2}x+1}{x^2-\sqrt{2}x+1}\right)+c$ (d) None of these

261. $\displaystyle\int \dfrac{x+2}{(x^2+3x+3)\sqrt{x+1}}\, dx$ is equal to

(a) $\dfrac{1}{\sqrt{3}} \tan^{-1}\left(\dfrac{x}{\sqrt{3(x+1)}}\right)$ (b) $\dfrac{2}{\sqrt{3}} \tan^{-1}\left(\dfrac{x}{\sqrt{3(x+1)}}\right)$ (c) $\dfrac{2}{\sqrt{3}} \tan^{-1}\left(\dfrac{x}{\sqrt{x+1}}\right)$ (d) None of these

262. $\displaystyle\int \dfrac{dx}{(1+x^2)\sqrt{1-x^2}} =$ **[MNR 1985]**

(a) $\dfrac{1}{\sqrt{2}} \tan^{-1}\left[\dfrac{\sqrt{1-x^2}}{x\sqrt{2}}\right]+c$ (b) $\dfrac{1}{\sqrt{2}} \tan^{-1}\left[\dfrac{x\sqrt{2}}{\sqrt{1-x^2}}\right]+c$ (c) $\sqrt{2} \tan^{-1}\left[\dfrac{\sqrt{1-x^2}}{x\sqrt{2}}\right]+c$ (d) $-\sqrt{2} \tan^{-1}\left[\dfrac{\sqrt{1-x^2}}{x\sqrt{2}}\right]+c$

Integration of Rational functions by using Partial fractions

Basic Level

263. Correct evaluation of $\displaystyle\int \dfrac{x}{(x-2)(x-1)}\, dx$ is **[MP PET 1993]**

(a) $\log_e \dfrac{(x-2)^2}{(x-1)}+p$ (b) $\log_e \dfrac{(x-1)}{(x-2)}+p$ (c) $\dfrac{x-1}{x-2}+p$ (d) $2\log_e \dfrac{(x-2)}{(x-1)}+p$

(where p is an aribitrary constant)

264. $\displaystyle\int \dfrac{dx}{(x+1)(x+2)} =$ **[MP PET 1987]**

(a) $\log\dfrac{(x+2)}{(x+1)}+c$ (b) $\log(x+1)+\log(x+2)+c$ (c) $\log\dfrac{(x+1)}{(x+2)}+c$ (d) None of these

265. $\displaystyle\int \dfrac{dx}{1-x^2} =$ **[MP PET 1987, 92, 2000]**

(a) $\tan^{-1} x + c$ (b) $\sin^{-1} x + c$ (c) $\dfrac{1}{2}\log\left|\dfrac{1+x}{1-x}\right|+c$ (d) $\dfrac{1}{2}\log\left|\dfrac{1-x}{1+x}\right|+c$

266. $\displaystyle\int \dfrac{x-1}{(x-3)(x-2)}\, dx =$ **[Roorkee 1978]**

(a) $\log(x-3)-\log(x-2)+c$ (b) $\log(x-3)^2-\log(x-2)+c$ (c) $\log(x-3)+\log(x-2)+c$ (d) $\log(x-3)^2+\log(x-2)+c$

267. $\displaystyle\int \dfrac{1}{x-x^3}\, dx =$ **[MP PET 1996]**

(a) $\dfrac{1}{2}\log\dfrac{(1-x^2)}{x^2}+c$ (b) $\log\dfrac{(1-x)}{x(1+x)}+c$ (c) $\log x(1-x^2)+c$ (d) $\dfrac{1}{2}\log\dfrac{x^2}{(1-x^2)}+c$

268. If $\displaystyle\int \dfrac{1}{(\sin x+4)(\sin x-1)}\, dx = A\dfrac{1}{\tan\dfrac{x}{2}-1} + B\tan^{-1} f(x)+c$, then

(a) $A=\dfrac{1}{5}$, $B=\dfrac{-2}{5\sqrt{15}}$, $f(x)=\dfrac{4\tan x+3}{\sqrt{15}}$ (b) $A=-\dfrac{1}{5}$, $B=\dfrac{1}{\sqrt{15}}$, $f(x)=\dfrac{4\tan\left(\dfrac{x}{2}\right)+1}{\sqrt{15}}$

(c) $A = \dfrac{2}{5}$, $B = \dfrac{-2}{5}$, $f(x) = \dfrac{4\tan x + 1}{5}$

(d) $A = \dfrac{2}{5}$, $B = \dfrac{-2}{5\sqrt{15}}$, $f(x) = \dfrac{4\tan \frac{x}{2} + 1}{\sqrt{15}}$

269. $\displaystyle\int \dfrac{dx}{(\sin x - 2\cos x)(2\sin x + \cos x)} =$

(a) $\dfrac{1}{5}\log\left|\dfrac{\tan x - 2}{1 + 2\tan x}\right| + c$

(b) $-\dfrac{1}{5}\log\left|\dfrac{\tan x - 2}{1 + 2\tan x}\right| + c$

(c) $\log\left|\dfrac{\tan x - 2}{1 + 2\tan x}\right| + c$

(d) $-\log\left|\dfrac{\tan x - 2}{1 + 2\tan x}\right| + c$

270. $\displaystyle\int \dfrac{dx}{(x-1)^2(x-2)} =$ **[CBSE PMT 1994]**

(a) $\log\left|\dfrac{x-2}{x-1}\right| + \dfrac{1}{x-1} + c$

(b) $\log\left|\dfrac{x-1}{x-2}\right| + \dfrac{1}{x-1} + c$

(c) $\log\left|\dfrac{x-2}{x-1}\right| - \dfrac{1}{x-1} + c$

(d) $\log\left|\dfrac{x-1}{x-2}\right| - \dfrac{1}{x-1} + c$

271. $\displaystyle\int \dfrac{x-1}{(x+1)^2}\, dx =$

(a) $\log(x+1) + \dfrac{2}{x+1} + c$

(b) $\log(x+1) - \dfrac{2}{x+1} + c$

(c) $\dfrac{2}{x+1} - \log(x+1) + c$

(d) None of these

272. $\displaystyle\int \dfrac{2x}{(2x+1)^2}\, dx =$ **[DSSE 1985]**

(a) $\dfrac{1}{2}\log(2x+1) + \dfrac{1}{2(2x+1)} + c$

(b) $\dfrac{1}{2}\log(2x+1) - \dfrac{1}{2(2x+1)} + c$

(c) $2\log(2x+1) + \dfrac{1}{2(2x+1)} + c$

(d) $2\log(2x+1) - \dfrac{1}{2(2x+1)} + c$

273. $\displaystyle\int \dfrac{dx}{(x - x^2)} =$ **[Roorkee 1982]**

(a) $\log x - \log(1-x) + c$

(b) $\log(1-x)^2 + c$

(c) $-\log x + \log(1-x) + c$

(d) $\log(x - x^2) + c$

274. Value of $\displaystyle\int \dfrac{x^2}{x^2 - a^2}\, dx =$ **[MNR 1997]**

(a) $x - \dfrac{a}{2}\log\left(\dfrac{x-a}{x+a}\right) + c$

(b) $x + \dfrac{a}{2}\log\left(\dfrac{x-a}{x+a}\right) + c$

(c) $x - \dfrac{a}{2}\log\left(\dfrac{x+a}{x-a}\right) + c$

(d) $x + \dfrac{a}{2}\log\left(\dfrac{x+a}{x-a}\right) + c$

275. $\displaystyle\int \dfrac{1}{(x-1)(x^2+1)}\, dx =$ **[Roorkee 1984]**

(a) $\dfrac{1}{2}\log(x-1) - \dfrac{1}{4}\log(x^2+1) - \dfrac{1}{2}\tan^{-1} x + c$

(b) $\dfrac{1}{2}\log(x-1) + \dfrac{1}{4}\log(x^2+1) - \dfrac{1}{2}\tan^{-1} x + c$

(c) $\dfrac{1}{2}\log(x-1) - \dfrac{1}{2}\log(x^2+1) - \dfrac{1}{2}\tan^{-1} x + c$

(d) None of these

276. If $\displaystyle\int \dfrac{2x+3}{(x-1)(x^2+1)}\, dx = \log_e\left\{(x-1)^{\frac{5}{2}}(x^2+1)^a\right\} - \dfrac{1}{2}\tan^{-1} x + A,$ Where A is any arbitrary constant, then the value of 'a' is

     [MP PET 1998]

(a) $\dfrac{5}{4}$

(b) $-\dfrac{5}{3}$

(c) $-\dfrac{5}{6}$

(d) $-\dfrac{5}{4}$

277. $\displaystyle\int \dfrac{dx}{(x^2+1)(x^2+4)} =$ **[MP PET 1995]**

(a) $\dfrac{1}{3}\tan^{-1} x - \dfrac{1}{3}\tan^{-1}\dfrac{x}{2} + c$

(b) $\dfrac{1}{3}\tan^{-1} x + \dfrac{1}{3}\tan^{-1}\dfrac{x}{2} + c$

(c) $\dfrac{1}{3}\tan^{-1}x - \dfrac{1}{6}\tan^{-1}\dfrac{x}{2} + c$

(d) $\tan^{-1}x - 2\tan^{-1}\dfrac{x}{2} + c$

278. $\displaystyle\int \dfrac{x^2}{(x^2+2)(x^2+3)}\,dx =$ **[AISSE 1990]**

(a) $-\sqrt{2}\tan^{-1}x + \sqrt{3}\tan^{-1}x + c$

(b) $-\sqrt{2}\tan^{-1}\dfrac{x}{\sqrt{2}} + \sqrt{3}\tan^{-1}\dfrac{x}{\sqrt{3}} + c$

(c) $\sqrt{2}\tan^{-1}\dfrac{x}{\sqrt{2}} + \sqrt{3}\tan^{-1}\dfrac{x}{\sqrt{3}} + c$

(d) None of these

279. $\displaystyle\int \dfrac{1}{(x^2+a^2)(x^2+b^2)}\,dx =$

(a) $\dfrac{1}{(a^2-b^2)}\left[\dfrac{1}{b}\tan^{-1}\left(\dfrac{x}{b}\right) - \dfrac{1}{a}\tan^{-1}\left(\dfrac{x}{a}\right)\right] + c$

(b) $\dfrac{1}{(b^2-a^2)}\left[\dfrac{1}{b}\tan^{-1}\left(\dfrac{x}{b}\right) - \dfrac{1}{a}\tan^{-1}\left(\dfrac{x}{a}\right)\right] + c$

(c) $\dfrac{1}{b}\tan^{-1}\left(\dfrac{x}{b}\right) - \dfrac{1}{a}\tan^{-1}\left(\dfrac{x}{a}\right) + c$

(d) $\dfrac{1}{a}\tan^{-1}\left(\dfrac{x}{a}\right) - \dfrac{1}{b}\tan^{-1}\left(\dfrac{x}{b}\right) + c$

280. $\displaystyle\int \dfrac{x\,dx}{(x^2-a^2)(x^2-b^2)} =$ **[Roorkee 1976]**

(a) $\dfrac{1}{(a^2-b^2)}\log\left(\dfrac{x^2-a^2}{x^2-b^2}\right) + c$

(b) $\dfrac{1}{a^2-b^2}\log\left(\dfrac{x^2-b^2}{x^2-a^2}\right) + c$

(c) $\dfrac{1}{2(a^2-b^2)}\log\left(\dfrac{x^2-a^2}{x^2-b^2}\right) + c$

(d) $\dfrac{1}{2(a^2-b^2)}\log\left(\dfrac{x^2-b^2}{x^2-a^2}\right) + c$

281. If $\displaystyle\int \dfrac{(2x^2+1)dx}{(x^2-4)(x^2-1)} = \log\left[\left(\dfrac{x+1}{x-1}\right)^a\left(\dfrac{x-2}{x+2}\right)\right] + c,$ then the values of a and b are respectively **[Roorkee 2000]**

(a) $\dfrac{1}{2}, \dfrac{3}{4}$
(b) $-1, \dfrac{3}{2}$
(c) $1, \dfrac{3}{2}$
(d) $\dfrac{-1}{2}, \dfrac{3}{4}$

282. If $\displaystyle\int \dfrac{2x^2+3}{(x^2-1)(x^2+4)}dx = a\log\left(\dfrac{x-1}{x+2}\right) + b\tan^{-1}\left(\dfrac{x}{2}\right) + c$, then values of a and b are **[Rajasthan PET 2000]**

(a) $(1,-1)$
(b) $(-1,1)$
(c) $\left(\dfrac{1}{2}, -\dfrac{1}{2}\right)$
(d) $\left(\dfrac{1}{2}, \dfrac{1}{2}\right)$

283. For $x > 1$, $\displaystyle\int \dfrac{1}{x(x^4-1)}\,dx =$ **[Rajasthan PET 1997, 89]**

(a) $\log\dfrac{x^4-1}{x^4} + k$
(b) $\dfrac{1}{4}\log\dfrac{x^4-1}{x^4} + k$
(c) $\log\dfrac{x^4-1}{x} + k$
(d) $\dfrac{1}{4}\log\dfrac{x^4-1}{x} + k$

284. $\displaystyle\int \dfrac{dx}{e^x + 1 - 2e^x} =$

(a) $\log(e^x-1) - \log(e^x+2) + c$

(b) $\dfrac{1}{2}\log(e^x-1) - \dfrac{1}{3}\log(e^x+2) + c$

(c) $\dfrac{1}{3}\log(e^x-1) - \dfrac{1}{3}\log(e^x+2) + c$

(d) $\dfrac{1}{3}\log(e^x-1) + \dfrac{1}{3}\log(e^x+2) + c$

285. $\displaystyle\int \dfrac{x^2}{x^2+6x-3}\,dx =$ **[AICBSE 1999]**

(a) $x + 3 \log|x^2 + 6x - 3| + \dfrac{21}{4\sqrt{3}} \log\left|\dfrac{x + 3 - 2\sqrt{3}}{x + 3 + 2\sqrt{3}}\right| + c$

(b) $x - 3 \log|x^2 + 6x - 3| + \dfrac{21}{4\sqrt{3}} \log\left|\dfrac{x + 3 - 2\sqrt{3}}{x + 3 + 2\sqrt{3}}\right| + c$

(c) $x - 3 \log|x^2 + 6x - 3| - \dfrac{21}{4\sqrt{3}} \log\left|\dfrac{x + 3 - 2\sqrt{3}}{x + 3 + 2\sqrt{3}}\right| + c$

(d) None of these

286. $\displaystyle\int \dfrac{e^x}{(1 + e^x)(2 + e^x)} \, dx =$

(a) $\log[(1 + e^x)(2 + e^x)] + c$

(b) $\log\left[\dfrac{1 + e^x}{2 + e^x}\right] + c$

(c) $\log[(1 + e^x)\sqrt{2 + e^x}] + c$

(d) None of these

<center>*Advance Level*</center>

287. $\displaystyle\int \dfrac{x^3 - x - 2}{(1 - x^2)} \, dx =$ **[AICBSE 1985]**

(a) $\log\left(\dfrac{x + 1}{x - 1}\right) - \dfrac{x^2}{2} + c$

(b) $\log\left(\dfrac{x - 1}{x + 1}\right) + \dfrac{x^2}{2} + c$

(c) $\log\left(\dfrac{x + 1}{x - 1}\right) + \dfrac{x^2}{2} + c$

(d) $\log\left(\dfrac{x - 1}{x + 1}\right) - \dfrac{x^2}{2} + c$

288. $\displaystyle\int \dfrac{x^2 + x - 1}{x^2 + x - 6} \, dx =$ **[AISSE 1988]**

(a) $x + \log(x + 3) + \log(x - 2) + c$

(b) $x - \log(x + 3) + \log(x - 2) + c$

(c) $x - \log(x + 3) - \log(x - 2) + c$

(d) None of these

289. $\displaystyle\int \dfrac{dx}{1 + x + x^2 + x^3} =$ **[MP PET 1991]**

(a) $\log\sqrt{1 + x} - \dfrac{1}{2}\log\sqrt{1 + x^2} + \dfrac{1}{2}\tan^{-1} x + c$

(b) $\log\sqrt{1 + x} - \log\sqrt{1 + x^2} + \tan^{-1} x + c$

(c) $\log\sqrt{1 + x^2} - \log\sqrt{1 + x} + \dfrac{1}{2}\tan^{-1} x + c$

(d) $\log\sqrt{1 + x} + \tan^{-1} x + \log\sqrt{1 + x^2} + c$

290. $\displaystyle\int \dfrac{x^3 - 1}{x^3 + x} \, dx =$ **[Roorkee 1988, MP PET 2001]**

(a) $x - \log x + \dfrac{1}{2}\log(x^2 + 1) + \tan^{-1} x + c$

(b) $x - \log x + \log\sqrt{x^2 + 1} - \tan^{-1} x + c$

(c) $x + \log x + \log\sqrt{x^2 + 1} + \tan^{-1} x + c$

(d) None of these

291. $\displaystyle\int \dfrac{(1 + x)^3}{(1 - x)^3} \, dx =$

(a) $x + 6\log|1 - x| + \dfrac{12}{1 - x} - \dfrac{4}{(1 - x)^2} + c$

(b) $-x + 6\log|1 - x| + \dfrac{12}{1 - x} - \dfrac{4}{(1 - x)^2} + c$

(c) $-x - 6\log|1 - x| - \dfrac{12}{1 - x} - \dfrac{4}{(1 - x)^2} + c$

(d) None of these

292. $\displaystyle\int \dfrac{dx}{x(x^5 + 1)} =$ **[CBSE 1997]**

(a) $\dfrac{1}{5}\log\left|\dfrac{x^5}{x^5 + 1}\right| + c$

(b) $5\log\left|\dfrac{x^5}{x^5 + 1}\right| + c$

(c) $-\dfrac{1}{5}\log\left|\dfrac{x^5}{x^5 + 1}\right| + c$

(d) $-5\log\left|\dfrac{x^5}{x^5 + 1}\right| + c$

293. If $\displaystyle\int \dfrac{4e^x + 6e^{-x}}{9e^x - 4e^{-x}} \, dx = Ax + B\log(9e^{2x} - 4) + C$ then A, B and C are **[IIT 1990]**

(a) $A = \frac{3}{2},\quad B = \frac{36}{35},\quad C = \frac{3}{2}\log 3 +$ constant

(b) $A = \frac{3}{2},\quad B = \frac{35}{36},\quad C = \frac{3}{2}\log 3 +$ constant

(c) $A = -\frac{3}{2},\quad B = -\frac{35}{36},\quad C = -\frac{3}{2}\log 3 +$ constant

(d) None of these

294. $\int \frac{x}{x^4 - 1}\, dx =$

(a) $\frac{1}{4}\log\left[\frac{x^2 - 1}{x^2 + 1}\right] + c$

(b) $\frac{1}{4}\log\left[\frac{x^2 + 1}{x^2 - 1}\right] + c$

(c) $\frac{1}{2}\log\left[\frac{x^2 - 1}{x^2 + 1}\right] + c$

(d) $\frac{1}{2}\log\left[\frac{x^2 + 1}{x^2 - 1}\right] + c$

295. $\int \frac{dx}{\sin x + \sin 2x} =$ **[IIT 1984; J & KCET 1995]**

(a) $\frac{1}{6}\log(1 - \cos x) + \frac{1}{2}\log(1 + \cos x) - \frac{2}{3}\log(1 + 2\cos x) + c$

(b) $6\log(1 - \cos x) + 2\log(1 + \cos x) - \frac{2}{3}\log(1 + 2\cos x) + c$

(c) $6\log(1 - \cos x) + \frac{1}{2}\log(1 + \cos x) + \frac{2}{3}\log(1 + 2\cos x) + c$

(d) None of these

296. The value of $\int \frac{\cos^3 x + \cos^5 x}{\sin^2 x + \sin^4 x}\, dx$ is

(a) $\sin x - 6\tan^{-1}(\sin x) + c$

(b) $\sin x - 2(\sin x)^{-1} + c$

(c) $\sin x - 2(\sin x)^{-1} - 6\tan^{-1}(\sin x) + c$

(d) $\sin x - 2(\sin x)^{-1} + 5\tan^{-1}(\sin x) + c$

Reduction formulae for some Special cases, Integration of form $\int \sin^m x \cos^n x\, dx, \int \sin mx \cos nx\, dx, \int \sin mx \sin nx\, dx, \int \cos mx \cos nx\, dx$

Basic Level

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297. $\int \tan^4 x\, dx =$

(a) $\tan^3 x - \tan x + x + c$

(b) $\frac{1}{3}\tan^3 x - \tan x + x + c$

(c) $\frac{1}{3}\tan^3 x + \tan x + x + c$

(d) $\frac{1}{3}\tan^3 x + \tan x + 2x + c$

298. The value of $\int \sec^3 x\, dx$ will be   **[UPSEAT 1999]**

(a) $\frac{1}{2}[\sec x \tan x + \log(\sec x + \tan x)]$

(b) $\frac{1}{3}[\sec x \tan x + \log(\sec x + \tan x)]$

(c) $\frac{1}{4}[\sec x \tan x + \log(\sec x + \tan x)]$

(d) $\frac{1}{8}[\sec x \tan x + \log(\sec x + \tan x)]$

299. $\int \sec^{2/3} x \cdot \csc^{4/3} x\, dx =$

(a) $-3(\tan x)^{1/3} + c$

(b) $-3(\tan x)^{-1/3} + c$

(c) $3(\tan x)^{-1/3} + c$

(d) $(\tan x)^{-1/3} + c$

300. $\int \sin^4 x \cos^3 x\, dx =$ **[CBSE 1985]**

(a) $\frac{1}{5}\sin^5 x + \frac{1}{7}\sin^7 x + c$

(b) $\frac{1}{5}\sin^5 x - \frac{1}{7}\sin^7 x + c$

(c) $-\frac{1}{5}\sin^5 x + \frac{1}{7}\sin^7 x + c$

(d) None of these

301. $\int \sin^3 x\, dx$ is equal to   **[SCRA 1996]**

(a) $\sin^2 x + 1$

(b) $\sin x^2 + x^2 + 1$

(c) $\frac{\cos^3 x}{3} - \cos x$

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

302. Which value of constant not integration makes the value of integral of $\sin 3x \cdot \cos 5x$ equal to zero at $x = 0$ **[Roorkee 1971]**

(a) 0

(b) –3/16

(c) –5/6

(d) 1/8

303. $\int \sin 2x \cdot \sin 3x\, dx$ equals   **[Rajasthan PET 1989]**

(a) $\dfrac{(\sin x - \sin 5x)}{2} + c$ (b) $\dfrac{(\sin x - \sin 5x)}{10} + c$ (c) $\dfrac{(5 \sin x - \sin 5x)}{10} + c$ (d) None of these.

304. $\displaystyle\int \cos 2x . \sin 4x\, dx$ equals

(a) $\dfrac{\cos 2x}{2} + \dfrac{\cos 6x}{6} + c$ (b) $-\left(\dfrac{\cos 2x}{2} + \dfrac{\cos 6x}{6}\right) + c$ (c) $-\left(\dfrac{\cos 2x}{4} + \dfrac{\cos 6x}{12}\right) + c$ (d) None of these.

305. $\displaystyle\int \dfrac{\sin 5x}{\cos 7x . \cos 2x}\, dx$ is equal to

(a) $\log|\sec 7x| + c$ (b) $\log|\sec 7x . \sec 2x| + c$ (c) $\log|\sec 7x + \sec 2x| + c$ (d) None of these

306. $\displaystyle\int \cos^5 x\, dx =$

(a) $\sin x - \dfrac{2}{3}\sin^3 x + \dfrac{1}{5}\sin^5 x + c$ (b) $\sin x + \dfrac{2}{3}\sin^3 x + \dfrac{1}{5}\sin^5 x + c$

(c) $\sin x - \dfrac{2}{3}\sin^3 x - \dfrac{1}{5}\sin^5 x + c$ (d) None of these

Advance Level

307. If $f(x) = \displaystyle\int \cot^4 x\, dx + \dfrac{1}{3}\cot^3 x - \cot x$ and $f\left(\dfrac{\pi}{2}\right) = \dfrac{\pi}{2}$ then $f(x) =$

(a) $\dfrac{\pi}{2} - x$ (b) $x - \pi$ (c) $\pi - x$ (d) x

Integration of Hyperbolic Functions

Basic Level

308. $\displaystyle\int \dfrac{dx}{1 + \cosh x} =$

(a) $\cot h\left(\dfrac{x}{2}\right) + c$ (b) $\tan h\left(\dfrac{x}{2}\right) + c$ (c) $\dfrac{1}{2}\tan h\left(\dfrac{x}{2}\right) + c$ (d) None of these

309. $\displaystyle\int \dfrac{dx}{x\sqrt{(\log x)^2 - 3}}$ is equal to

(a) $\sin h^{-1}\left(\log \dfrac{x}{\sqrt{3}}\right) + c$ (b) $\cos h^{-1}\left(\log \dfrac{x}{\sqrt{3}}\right) + c$ (c) $\cos h^{-1}\left(\log \dfrac{x}{\sqrt{2}}\right) + c$ (d) None of these

310. $\displaystyle\int \dfrac{(e^x + e^{-x})^2}{(e^x - e^{-x})^2}\, dx$ is equal to

(a) $2\log(e^x - e^{-x}) + c$ (b) $2\log(e^x + e^{-x}) + c$ (c) $x + \cot hx + c$ (d) $x - \cot hx + c$

311. $\displaystyle\int \dfrac{1}{x}\sqrt{\dfrac{x-1}{x+1}}\, dx$ equals

(a) $\cos h^{-1}x + \sec^{-1}x + c$ (b) $\sin h^{-1}x - \sec^{-1}x + c$ (c) $\cos h^{-1}x - \sec^{-1}x + c$ (d) $\sin h^{-1}x + \sec^{-1}x + c$

312. $\int \sqrt{\sec x - 1}\, dx$ is equal to

(a) $2 \sinh^{-1}\left\{\sqrt{2}\cos\left(\dfrac{x}{2}\right)\right\} + c$ (b) $-2 \sinh^{-1}\left\{\sqrt{2}\cos\left(\dfrac{x}{2}\right)\right\} + c$ (c) $-2 \cosh^{-1}\left\{\sqrt{2}\cos\left(\dfrac{x}{2}\right)\right\} + c$ (d) None of these

313. $\int e^x (\sinh x + \cosh x)\, dx$ is equal to **[Karnataka CET 1993]**

(a) $e^x \sec hx + c$ (b) $e^x \cos hx + c$ (c) $\sinh 2x + c$ (d) $\cosh 2x + c$

Integration of Surds like Expression

Basic Level

314. $\int \dfrac{x^{5/2}}{\sqrt{1+x^7}}\, dx$ is

(a) $\dfrac{2}{7}\log(x^{7/2} + \sqrt{x^7+1}) + c$ (b) $\dfrac{1}{2}\log\dfrac{x^7+1}{x^7-1} + c$ (c) $2\sqrt{1+x^7} + c$ (d) None of these

315. $\int \dfrac{dx}{x^{1/5}(1+x^{4/5})^{1/2}}$ is

(a) $\sqrt{1+x^{4/5}} + k$ (b) $\dfrac{5}{2}\sqrt{1+x^{4/5}} + k$ (c) $x^{4/5}(1+x^{4/5})^{1/2} + k$ (d) None of these

316. $\int x^{-\frac{2}{3}}(1+x^{\frac{1}{2}})^{-\frac{5}{3}}\, dx$ is equal to

(a) $3(1+x^{-1/2})^{-1/3} + c$ (b) $3(1+x^{-1/2})^{-2/3} + c$ (c) $3(1+x^{1/2})^{-2/3} + c$ (d) None of these

317. The value of $\int \dfrac{(x-x^3)^{1/3}}{x^4}\, dx$ is

(a) $\dfrac{3}{8}\left(\dfrac{1}{x^2}-1\right)^{\frac{4}{3}} + c$ (b) $-\dfrac{3}{8}\left(\dfrac{1}{x^2}-1\right)^{\frac{4}{3}} + c$ (c) $\dfrac{1}{8}\left(1-\dfrac{1}{x^2}\right)^{\frac{4}{3}} + 1$ (d) None of these

318. $\int \dfrac{(x^4-x)^{1/4}}{x^5}\, dx$ is equal to

(a) $\dfrac{4}{15}\left(1-\dfrac{1}{x^3}\right)^{\frac{5}{4}} + c$ (b) $\dfrac{4}{5}\left(1-\dfrac{1}{x^3}\right)^{\frac{5}{4}} + c$ (c) $\dfrac{4}{15}\left(1+\dfrac{1}{x^3}\right)^{\frac{5}{4}} + c$ (d) None of these

319. If $\int \dfrac{1}{x\sqrt{1-x^3}}\, dx = a\log\left|\dfrac{\sqrt{1-x^2}-1}{\sqrt{1-x^2}+1}\right| + b,$ then a is equal to

(a) $\dfrac{1}{3}$ (b) $\dfrac{2}{3}$ (c) $-\dfrac{1}{3}$ (d) $-\dfrac{2}{3}$

Advance Level

320. $\int \dfrac{1}{[(x-1)^3(x+2)^5]^{1/4}}\,dx$ is equal to

(a) $\dfrac{4}{3}\left(\dfrac{x-1}{x+2}\right)^{\frac{1}{4}}+c$

(b) $\dfrac{4}{3}\left(\dfrac{x+2}{x-1}\right)^{\frac{1}{4}}+c$

(c) $\dfrac{1}{3}\left(\dfrac{x-1}{x+2}\right)^{\frac{1}{4}}+c$

(d) $\dfrac{1}{3}\left(\dfrac{x+2}{x-1}\right)^{\frac{1}{4}}+c$

321. $\int \dfrac{1}{(1+x^2)\sqrt{1-x^2}}\,dx$ is equal to

(a) $\dfrac{1}{2}\tan^{-1}\left(\dfrac{\sqrt{2}x}{\sqrt{1-x^2}}\right)$

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

(c) $\dfrac{1}{\sqrt{2}}\tan^{-1}\left(\dfrac{\sqrt{2}x}{\sqrt{1-x^2}}\right)$

(d) None of these

322. Let $f(x)=\int \dfrac{x^2\,dx}{(1+x^2)(1+\sqrt{1+x^2})}$ and $f(0)=0,$ then $f(1)$ is

(a) $\log(1+\sqrt{2})$

(b) $\log(1+\sqrt{2})-\dfrac{\pi}{4}$

(c) $\log(1+\sqrt{2})+\dfrac{\pi}{4}$

(d) None of these

323. Let $\int \dfrac{x^{1/2}}{\sqrt{1-x^3}}\,dx=\dfrac{2}{3}gof(x)+c$, then

(a) $f(x)=\sqrt{x}$

(b) $f(x)=x^{3/2}$

(c) $f(x)=x^{2/3}$

(d) $g(x)=\sin^{-1}x$

(e) Both b and d

324. $\int \dfrac{dx}{\sqrt{x+x\sqrt{x}}}$ is equal to

(a) $\log\sqrt{x+x\sqrt{x}}+c$

(b) $\sqrt{1+\sqrt{x}}+c$

(c) $4\sqrt{1+\sqrt{x}}+c$

(d) None of these

325. $\int \dfrac{x^4-1}{x^2\sqrt{x^4+x^2+1}}\,dx=$

(a) $\sqrt{x^2+\dfrac{1}{x^2}+1}$

(b) $\dfrac{\sqrt{x^4+x^2+1}}{x}$

(c) $\sqrt{\dfrac{x^4+x^2+1}{x}}$

(d) Both a and b

326. $\int \dfrac{dx}{(x+\alpha)^{8/7}(x-\beta)^{6/7}}=$

(a) $\dfrac{6}{\alpha+\beta}\left(\dfrac{x-\beta}{x+\alpha}\right)^{\frac{1}{6}}$

(b) $\dfrac{6}{\alpha+\beta}\left(\dfrac{x+\alpha}{x-\beta}\right)^{\frac{1}{6}}$

(c) $\dfrac{7}{\alpha+\beta}\left(\dfrac{x+\alpha}{x-\beta}\right)^{\frac{1}{7}}$

(d) $\dfrac{7}{\alpha+\beta}\left(\dfrac{x-\beta}{x+\alpha}\right)^{\frac{1}{7}}$

327. $\int \dfrac{x\,dx}{(x^2+1)^{4/5}(x^2+2)^{6/5}}=$

(a) $\dfrac{2}{5}\left(\dfrac{x^2+2}{x^2+1}\right)^{\frac{1}{5}}$

(b) $\dfrac{5}{2}\left(\dfrac{x^2+2}{x^2+1}\right)^{-\frac{1}{5}}$

(c) $\dfrac{5}{2}\left(\dfrac{x^2+1}{x^2+2}\right)^{\frac{1}{5}}$

(d) Both (b) and (c)

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Answer Sheet

Assignment (Basic and Advance Level)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
d	b	a	b	b	c	b	c	c	b	a	c	c	c	a	a	a	a	d	a
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
b	b	b	a	c	a	d	c	d	d	d	a	a	b	d	b	d	a	b	d
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
a	b	a	a	c	a	c	d	a	c	c	b	c	a	d	d	b	a	c	b
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
c	a	b	c	b	c	a	b	b,c	b	c	c	c	a	c	a	b	d	a	a
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
b	c	c	c	b	a	d	b	d	b	c	c	a	a	b	a	b	a	b	c
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
c	b	a	a	a	b	b	b	a	a	b	a	d	a	c	a	a	c	a	b
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
c	b	b	c	a	b	b	b	b	d	d	d	a	a	b	a	a	c	a	c
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
d	b	a	c	c	c	a	b	b	c	b	a	a	b	c	d	b	a	b	b
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
b	c	a	a	b	a	a	a	b	b	b	a	a	c	a	a	b	c	d	d
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
b	b	b	d	c	b	b	c	c	b	a	c	c	b	d	a	b	a	c	c
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
a	c	a	a	b	c	a	a	a	c	d	d	c	b	b	a	a	d	d	b
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
d	d	c	a	c	a	a	b	d	b,d	a	a	b	b	b	a	c	d	a	c
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
b	a	a	a	a	b	b	d	c	a	a	c	b	a	a	a	a	a	a	b
261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
b	b	a	c	c	b	d	d	a	a	a	a	a	b	a	d	c	b	a	c
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
a	d	b	c	b	b	d	b	a	b	c	a	d	a	a	c	b	a	b	b
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320
c	b	c	c	d	a	d	b	b	d	c	c	b	a	b	b	b	a	a	a
321	322	323	324	325	326	327													
c	b	e	c	d	d	d													