

**GRADE XII**  
**Question Bank (MATHEMATICS)**  
**Chapter-7 Integrals**

**1 Marks:**

1. If  $\frac{d}{dx}[f(x)] = ax + b$  and  $f(0) = 0$  then  $f(x)$  is equal to **[BOARD 2023]**
- a)  $a + b$                       b)  $\frac{ax^2}{2} + bx$                       c)  $\frac{ax^2}{2} + bx + c$                       d)  $b$
2. If  $\frac{d}{dx}f(x) = 2x + \frac{3}{x}$  and  $f(1) = 1$  then  $f(x)$  is **[BOARD 2023]**
- a)  $x^2 + 3 \log|x| + 1$     b)  $x^2 + 3 \log|x|$                       c)  $2 - \frac{3}{x^2}$                       d)  $x^2 + 3 \log|x| - 4$
3.  $\int \frac{1}{x(\log x)^2} dx$  is equal to **[BOARD 2024]**
- a)  $2 \log(\log x) + C$     b)  $-\frac{1}{\log x} + C$                       c)  $\frac{(\log x)^3}{3} + C$                       d)  $\frac{3}{(\log x)^3} + C$
4.  $\int e^{5 \log x} dx$  is equal to **[BOARD 2023]**
- a)  $\frac{x^5}{5} + C$                       b)  $\frac{x^6}{6} + C$                       c)  $5x^4 + C$                       d)  $6x^5 + C$
5.  $\int 2^{x+2} dx$  is equal to **[BOARD 2023]**
- a)  $2^{x+2} + C$                       b)  $2^{x+2} \log 2 + C$                       c)  $\frac{2^{x+2}}{\log 2} + C$                       d)  $2 \frac{2^x}{\log 2} + C$
6.  $\int \frac{2 \cos 2x - 1}{1 + 2 \sin x} dx$  is equal to **[BOARD 2023]**
- a)  $x - 2 \cos x + C$     b)  $x + 2 \cos x + C$                       c)  $-x - 2 \cos x + C$                       d)  $-x + 2 \cos x + C$
7.  $\int \frac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha} dx$  is equal to **[BOARD 2025]**
- a)  $2(\sin x + x \cos \alpha) + C$                       c)  $2(\sin x - x \cos \alpha) + C$   
b)  $2(\sin x + 2x \cos \alpha) + C$                       d)  $2(\sin x + \sin \alpha) + C$
8.  $\int \frac{dx}{\sin^2 x \cos^2 x}$  is equal to **[BOARD 2025]**
- a)  $\tan x + \cot x + C$     b)  $(\tan x + \cot x)^2 + C$     c)  $\tan x - \cot x + C$                       d)  $(\tan x - \cot x)^2 + C$

9.  $\int \frac{\cos 2x}{\sin^2 x \cos^2 x} dx$  is equal to **[BOARD 2023 & 2025]**

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

10.  $\int \frac{\sec x}{\sec x - \tan x} dx$  is equal to **[BOARD 2023]**

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

11.  $\int \frac{1-2\sin x}{\cos^2 x} dx$  is equal to **[BOARD 2025]**

- a)  $\tan x - 2 \sec x + C$    c)  $-\tan x + 2 \sec x + C$   
b)  $-\tan x - 2 \sec x + C$    d)  $\tan x + 2 \sec x + C$

12.  $\int e^x(\cos x - \sin x) dx$  is equal to **[BOARD 2025]**

- a)  $e^x \sin x + C$    b)  $-e^x \sin x + C$    c)  $-e^x \cos x + C$    d)  $e^x \cos x + C$

13.  $\int e^{-x} \left(\frac{x+1}{x^2}\right) dx$  is **[BOARD 2023]**

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

14. If  $\int e^{-3 \log x} dx = f(x) + C$  then  $f(x)$  is **[BOARD 2025]**

- a)  $e^{-3 \log x}$    b)  $e^{\log\left(\frac{1}{x^3}\right)}$    c)  $-\frac{1}{2x^2}$    d)  $-\frac{1}{4x^4}$

15.  $\int e^{3 \log x} (x^4 + 1)^{-1} dx$  is equal to **[BOARD 2024]**

- a)  $\frac{1}{4} \log(x^4 + 1) + C$    c)  $\frac{x^3}{x^4+1} + C$   
b)  $\frac{1}{4} \log\left(\frac{1}{x^4+1}\right) + C$    d)  $\frac{e^x}{x^4+1} + C$

16.  $\int \frac{x-3}{(x-1)^3} e^x dx$  is equal to **[BOARD 2024]**

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

17.  $\int \frac{1+\tan x}{1-\tan x} dx$  is equal to **[BOARD 2023]**

- a)  $\sec^2\left(\frac{\pi}{4} + x\right) + C$    c)  $\sec^2\left(\frac{\pi}{4} - x\right) + C$   
b)  $\log\left|\sec\left(\frac{\pi}{4} + x\right)\right| + C$    d)  $\log\left|\sec\left(\frac{\pi}{4} - x\right)\right| + C$

18.  $\int \frac{dx}{\sqrt{9-4x^2}}$  is equal to **[BOARD 2024]**

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

19. Anti-derivative of  $\frac{\tan x - 1}{\tan x + 1}$  with respect to  $x$  is **[BOARD 2023]**

- a)  $\sec^2 \left( \frac{\pi}{4} - x \right) + C$                       c)  $-\sec^2 \left( \frac{\pi}{4} - x \right) + C$   
b)  $\log \left| \sec \left( \frac{\pi}{4} - x \right) \right| + C$                       d)  $-\log \left| \sec \left( \frac{\pi}{4} - x \right) \right| + C$

20. Anti-derivative of  $\sqrt{1 + \sin 2x}$ ,  $x \in \left[ 0, \frac{\pi}{4} \right]$  is **[BOARD 2024]**

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

21.  $\int \sqrt{1 + \sin x} dx$  is **[BOARD 2025]**

- a)  $2 \left( -\sin \frac{x}{2} + \cos \frac{x}{2} \right) + C$                       c)  $-2 \left( \sin \frac{x}{2} + \cos \frac{x}{2} \right) + C$   
b)  $2 \left( \sin \frac{x}{2} - \cos \frac{x}{2} \right) + C$                       d)  $2 \left( \sin \frac{x}{2} + \cos \frac{x}{2} \right) + C$

22. The primitive of  $\frac{2}{1 + \cos 2x}$  is **[BOARD 2023]**

- a)  $\sec^2 x$                       b)  $2 \sec^2 x \tan x$                       c)  $\tan x$                       d)  $-\cot x$

23.  $\int_{-a}^a f(x) dx = 0$  if **[BOARD 2024]**

- a)  $f(-x) = f(x)$                       b)  $f(-x) = -f(x)$                       c)  $f(a-x) = f(x)$                       d)  $f(a-x) = -f(x)$

24.  $\int_a^b f(x) dx$  is equal to **[BOARD 2024]**

- a)  $\int_a^b f(a-x) dx$                       c)  $\int_a^b f(x - (a+b)) dx$   
b)  $\int_a^b f(a+b-x) dx$                       d)  $\int_a^b f((a-x) + (b-x)) dx$

25. If  $f(x)$  is an odd function then  $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} f(x) \cos^3 x dx$  equals **[BOARD 2024]**

- a)  $2 \int_0^{\frac{\pi}{2}} f(x) \cos^3 x dx$                       c)  $2 \int_0^{\frac{\pi}{2}} f(x) dx$   
b) 0                      d)  $2 \int_0^{\frac{\pi}{2}} \cos^3 x dx$

26. If  $f(2a - x) = f(x)$  then  $\int_0^{2a} f(x)dx$  is **[BOARD 2025]**

- a)  $\int_0^{2a} f\left(\frac{x}{2}\right)dx$       b)  $\int_0^a f(x)dx$       c)  $2 \int_a^0 f(x)dx$       d)  $2 \int_0^a f(x)dx$

27. If  $g(x)$  is a continuous function satisfying  $g(-x) = -g(x)$  then  $\int_0^{2a} g(x)dx$  is equal to **[BOARD 2024]**

- a) 0      c)  $2 \int_0^a g(x)dx$   
b)  $\int_{-a}^a g(x)dx$       d)  $-\int_{-2a}^0 g(x)dx$

28. If  $\int_0^a x dx \leq \frac{a}{2} + 6$  then **[BOARD 2025]**

- a)  $-4 \leq a \leq 3$       b)  $a \geq 4, a \leq -3$       c)  $-3 \leq a \leq 4$       d)  $-3 \leq a \leq 0$

29. If  $\int_0^1 \frac{e^x}{1+x} dx = \alpha$ , then  $\int_0^1 \frac{e^x}{(1+x)^2} dx$  is equal to **[BOARD 2025]**

- a)  $\alpha - 1 + \frac{e}{2}$       b)  $\alpha + 1 - \frac{e}{2}$       c)  $\alpha - 1 - \frac{e}{2}$       d)  $\alpha + 1 + \frac{e}{2}$

30. If  $\int_0^a 3x^2 dx = 8$  then the value of 'a' is **[BOARD 2023]**

- a) 2      b) 4      c) 8      d) 10

31. If  $\int_0^a \frac{1}{4+x^2} dx = \frac{\pi}{6}$  then the value of 'a' is **[BOARD 2024 & 2025]**

- a)  $\frac{\sqrt{3}}{2}$       b)  $2\sqrt{3}$       c)  $\sqrt{3}$       d)  $\frac{1}{\sqrt{3}}$

32. If  $\int_0^2 2e^{2x} dx = \int_0^a e^x dx$  the value of 'a' is **[BOARD 2024]**

- a) 1      b) 2      c) 4      d)  $\frac{1}{2}$

33. If  $\int_0^{2\pi} \cos^2 x dx = k \int_0^{\frac{\pi}{2}} \cos^2 x dx$  then the value of k is **[BOARD 2023]**

- a) 4      b) 2      c) 1      d) 0

34. If  $\int_{-2}^3 x^2 dx = k \int_0^2 x^2 dx + \int_2^3 x^2 dx$  then the value of k is **[BOARD 2024]**

- a) 2      b) 1      c) 0      d)  $\frac{1}{2}$

35. If  $\int \frac{2^x}{x^2} dx = k 2^{\frac{1}{x}} + C$ , then k is equal to **[BOARD 2025]**

a)  $\frac{-1}{\log 2}$                       b)  $-\log 2$                       c)  $-1$                       d)  $\frac{1}{2}$

36.  $\int_0^1 \frac{2x}{5x^2+1} dx$  is equal to **[BOARD 2025]**

a)  $\frac{1}{5} \log 6$                       b)  $\frac{1}{5} \log 5$                       c)  $\frac{1}{2} \log 6$                       d)  $\frac{1}{2} \log 5$

37.  $\int_0^2 \sqrt{4-x^2} dx.$  **[BOARD 2023]**

a)  $2 \log 2$                       b)  $-2 \log 2$                       c)  $\frac{\pi}{2}$                       d)  $\pi$

38. The value of  $\int_0^3 \frac{dx}{\sqrt{9-x^2}}$  is **[BOARD 2024]**

a)  $\frac{\pi}{6}$                       b)  $\frac{\pi}{4}$                       c)  $\frac{\pi}{2}$                       d)  $\frac{\pi}{18}$

39.  $\int_0^{\frac{\pi}{2}} \frac{\sin x - \cos x}{1 + \sin x \cos x} dx$  is equal to **[BOARD 2024]**

a)  $\pi$                       b)  $0$                       c)  $\int_0^{\frac{\pi}{2}} \frac{2 \sin x}{1 + \sin x \cos x} dx$                       d)  $\frac{\pi^2}{4}$

40. The value of  $\int_1^e \log x dx$  is **[BOARD 2024]**

a)  $0$                       b)  $1$                       c)  $e$                       d)  $e \log e$

41. The value of  $\int_0^1 \frac{dx}{e^x + e^{-x}}$  is **[BOARD 2025]**

a)  $-\frac{\pi}{4}$                       b)  $\frac{\pi}{4}$                       c)  $\tan^{-1} e - \frac{\pi}{4}$                       d)  $\tan^{-1} e$

42. The value of  $\int_0^{\frac{\pi}{6}} \sin 3x dx$  is **[BOARD 2023]**

a)  $-\frac{\sqrt{3}}{2}$                       b)  $-\frac{1}{3}$                       c)  $\frac{\sqrt{3}}{2}$                       d)  $\frac{1}{3}$

43. The value of  $\int_0^{\pi} \tan^2\left(\frac{\theta}{3}\right) d\theta.$  **[BOARD 2024]**

a)  $\pi + \sqrt{3}$                       b)  $3\sqrt{3} - \pi$                       c)  $\sqrt{3} - \pi$                       d)  $\pi - \sqrt{3}$

44. The value of  $\int_0^{\frac{\pi}{4}} (\sin 2x) dx$  is **[BOARD 2023]**

a)  $0$                       b)  $1$                       c)  $\frac{1}{2}$                       d)  $-\frac{1}{2}$

45. The value of  $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \cot \theta \operatorname{cosec}^2 \theta d\theta$  is **[BOARD 2024]**

- a)  $\frac{1}{2}$                       b)  $-\frac{1}{2}$                       c) 0                      d)  $-\frac{\pi}{8}$
46. The value of  $\int_0^{\frac{\pi}{2}} \log \tan x \, dx$  is **[BOARD 2023]**
- a)  $\frac{\pi}{2}$                       b) 0                      c)  $-\frac{\pi}{2}$                       d) 1
47. The value of  $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \log \tan x \, dx$  is **[BOARD 2024]**
- a)  $\frac{\pi}{2}$                       b)  $\frac{\pi}{4}$                       c) 0                      d)  $\frac{\pi}{12}$
48. The value of  $\int_{-1}^1 |x| \, dx$  is **[BOARD 2024]**
- a) -2                      b) -1                      c) 1                      d) 2
49. The value of  $\int_{-1}^1 x|x| \, dx$  is **[BOARD 2024]**
- a)  $\frac{1}{6}$                       b)  $\frac{1}{3}$                       c)  $-\frac{1}{6}$                       d) 0
50.  $\int_{-1}^1 \frac{|x|}{x} \, dx, x \neq 0$  is equal to **[BOARD 2025]**
- a) -1                      b) 0                      c) 1                      d) 2
51.  $\int_{-1}^1 \frac{|x-2|}{x-2} \, dx, x \neq 2$  is equal to **[BOARD 2023]**
- a) 1                      b) -1                      c) 2                      d) -2
52.  $\int_0^{\frac{\pi}{6}} \sec^2 \left( x - \frac{\pi}{6} \right) \, dx$  is equal to **[BOARD 2023]**
- a)  $\frac{1}{\sqrt{3}}$                       b)  $-\frac{1}{\sqrt{3}}$                       c)  $\sqrt{3}$                       d)  $-\sqrt{3}$
53.  $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} x^3 \cos^2 x \, dx$  is equal to **[BOARD 2024]**
- a) 0                      b) -1                      c) 1                      d) 2
54.  $\int_0^{\frac{\pi}{2}} \cos x e^{\sin x} \, dx$  is equal to **[BOARD 2025]**
- a) 0                      b)  $1 - e$                       c)  $e - 1$                       d)  $e$
55.  $\int_0^4 (e^{2x} + x) \, dx$  is equal to **[BOARD 2023]**
- a)  $\frac{15+e^8}{2}$                       b)  $\frac{16-e^8}{2}$                       c)  $\frac{e^8-15}{2}$                       d)  $\frac{-e^8-15}{2}$

**Options for Assertion and Reasoning Questions:**

- a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)
- b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)
- c) Assertion (A) is true but reason (R) is false
- d) Assertion (A) is false but reason (R) is true

56. **Assertion (A):**  $\int_2^8 \frac{\sqrt{10-x}}{\sqrt{x}+\sqrt{10-x}} dx = 3.$

**Reason (R):**  $\int_a^b f(x)dx = \int_a^b f(a+b-x)dx.$  [BOARD 2023]

**2 Marks:**

- 1. Given  $\frac{d}{dx} F(x) = \frac{1}{\sqrt{2x-x^2}}$  and  $F(1) = 0$  find  $F(x).$  [BOARD 2024]
- 2. Find  $\int 2x^3 e^{x^2} dx.$  [BOARD 2025]
- 3. Find  $\int x\sqrt{1+2x} dx.$  [BOARD 2024]
- 4. Find  $\int \frac{1}{5+4x-x^2} dx.$  [BOARD 2024]
- 5. Find  $\int \frac{1}{x(x^2-1)} dx.$  [BOARD 2024]
- 6. Find  $\int \frac{x^3-1}{x^3-x} dx.$  [BOARD 2024]
- 7. Find  $\int \frac{2x}{(x^2+1)(x^2-4)} dx.$  [BOARD 2024]
- 8. Find  $\int \frac{e^{4x}-1}{e^{4x}+1} dx.$  [BOARD 2024]
- 9. Find  $\int \cos^3 x e^{\log \sin x} dx.$  [BOARD 2024]
- 10. Evaluate:  $\int_0^{a^3} \frac{x^2}{x^6+a^6} dx.$  [BOARD 2024]
- 11. Evaluate:  $\int_0^{\frac{\pi}{2}} \sin 2x \cos 3x dx.$  [BOARD 2024]
- 12. Evaluate:  $\int_0^{\frac{\pi}{4}} \sqrt{1+\sin 2x} dx.$  [BOARD 2025]
- 13. Evaluate:  $\int_0^{\pi} \frac{\sin 2px}{\sin x} dx.$  [BOARD 2025]

14. Evaluate:  $\int_0^{\frac{\pi^2}{4}} \frac{\sin \sqrt{x}}{\sqrt{x}} dx$ . [BOARD 2024]

15. Evaluate:  $\int_{-\frac{1}{2}}^{\frac{1}{2}} \cos x \log \left( \frac{1+x}{1-x} \right) dx$ . [BOARD 2024]

16. Evaluate:  $\int_{-4}^0 |x+2| dx$ . [BOARD 2024]

**3 Marks:**

1. Find  $\int \frac{\sqrt{x}}{1+\sqrt{x^2}} dx$ . [BOARD 2025]

2. Find  $\int e^{\cot^{-1} x} \left( \frac{1-x+x^2}{1+x^2} \right) dx$ . [BOARD 2023]

3. Find  $\int \frac{\cos x}{\sin 3x} dx$ . [BOARD 2023]

4. Find  $\int \frac{dx}{\cos x \sqrt{\cos 2x}}$ . [BOARD 2024]

5. Find  $\int \frac{x+\sin x}{1+\cos x} dx$ . [BOARD 2025]

6. Find  $\int \frac{\cos x}{1+\cos x+\sin x} dx$ . [BOARD 2025]

7. Find  $\int \frac{\cos 2x}{(\sin x+\cos x)^2} dx$ . [BOARD 2025]

8. Find  $\int \frac{\cos \theta}{\sqrt{3-3 \sin \theta-\cos^2 \theta}} d\theta$ . [BOARD 2023]

9. Find  $\int \frac{e^x}{\sqrt{5-4 e^x-e^{2x}}} dx$ . [BOARD 2023]

10. Find  $\int \frac{1}{\cos(x-a) \cos(x-b)} dx$ . [BOARD 2023]

11. Find  $\int \frac{dx}{\sqrt{\sin^3 x \cos(x-a)}}$ . [BOARD 2023]

12. Find  $\int \frac{\sin^{-1} x}{(1-x^2)^{\frac{3}{2}}} dx$ . [BOARD 2023]

13. Find  $\int \frac{1}{x[(\log x)^2-3 \log x-4]} dx$ . [BOARD 2024]

14. Find  $\int \frac{x^{-1}}{(\log x)^2-5 \log x+4} dx$ . [BOARD 2024]

15. Find  $\int \frac{1}{x} \sqrt{\frac{x+a}{x-a}} dx$ . [BOARD 2025]
16. Find  $\int \frac{x+2}{\sqrt{x^2-4x-5}} dx$ . [BOARD 2023]
17. Find  $\int \frac{3x+5}{\sqrt{x^2+2x+4}} dx$ . [BOARD 2024]
18. Find  $\int \frac{5x-3}{\sqrt{1+4x-2x^2}} dx$ . [BOARD 2024]
19. Find  $\int \frac{e^x}{\sqrt{e^{2x}-4e^x-5}} dx$ . [BOARD 2023]
20. Find  $\int \frac{x^2}{x^2+6x+12} dx$ . [BOARD 2023]
21. Find  $\int \frac{\sqrt{x}}{(x+1)(x-1)} dx$ . [BOARD 2024]
22. Find  $\int \frac{2x^2+1}{x^2(x^2+4)} dx$ . [BOARD 2023]
23. Find  $\int \frac{x}{(x^2+1)(x-1)} dx$ . [BOARD 2023]
24. Find  $\int \frac{2}{(1-x)(1+x^2)} dx$ . [BOARD 2023]
25. Find  $\int \frac{2x+3}{x^2(x+3)} dx$ . [BOARD 2024]
26. Find  $\int \frac{x^2}{(x^2+4)(x^2+9)} dx$ . [BOARD 2023 & 2024]
27. Find  $\int \frac{x^2+1}{(x^2+2)(x^2+4)} dx$ . [BOARD 2024]
28. Find  $\int \frac{2x}{(x^2+3)(x^2-5)} dx$ . [BOARD 2025]
29. Find  $\int \frac{1}{\sqrt{x}(\sqrt{x}+1)(\sqrt{x}+2)} dx$ . [BOARD 2023]
30. Find  $\int \frac{2x-1}{(x-1)(x+2)(x-3)} dx$ . [BOARD 2025]
31. Find  $\int \frac{2x+1}{(x+1)^2(x-1)} dx$ . [BOARD 2024]
32. Find  $\int \frac{x^2+x+1}{(x+1)^2(x+2)} dx$ . [BOARD 2023]
33. Find  $\int \frac{x^4}{(x-1)(x^2+1)} dx$ . [BOARD 2023]

34. Find  $\int \sec^3 \theta d\theta$ . **[BOARD 2024]**
35. Find  $\int x^2 \sin^{-1} \left( x^{\frac{3}{2}} \right) dx$ . **[BOARD 2024]**
36. Find  $\int x^2 \log(x^2 + 1) dx$ . **[BOARD 2023]**
37. Find  $\int x^2 \log(x^2 - 1) dx$ . **[BOARD 2024]**
38. Find  $\int e^{x^2} (x^5 + 2x^3) dx$ . **[BOARD 2023]**
39. Find  $\int e^x \left[ \frac{1}{(1+x^2)^{\frac{3}{2}}} + \frac{x}{\sqrt{1+x^2}} \right] dx$ . **[BOARD 2024]**
40. Find  $\int e^x \left( \frac{1-\sin x}{1-\cos x} \right) dx$ . **[BOARD 2023]**
41. Find  $\int e^x \left( \frac{2+\sin 2x}{1+\cos 2x} \right) dx$ . **[BOARD 2024]**
42. Evaluate:  $\int_1^3 (|x-1| + |x-2|) dx$ . **[BOARD 2023 & 2025]**
43. Evaluate:  $\int_1^3 (|x-1| + |x-2| + |x-3|) dx$ . **[BOARD 2024]**
44. Evaluate:  $\int_0^5 (|x-1| + |x-2| + |x-5|) dx$ . **[BOARD 2025]**
45. Evaluate:  $\int_{-1}^1 |x^4 - x| dx$ . **[BOARD 2023]**
46. Evaluate:  $\int_{-2}^2 \sqrt{\frac{2-x}{2+x}} dx$ . **[BOARD 2024]**
47. Evaluate:  $\int_{\frac{1}{3}}^1 \frac{(x-x^3)^{\frac{1}{3}}}{x^4} dx$ . **[BOARD 2023]**
48. Evaluate:  $\int_{\frac{\pi}{2}}^{\pi} e^x \left( \frac{1-\sin x}{1-\cos x} \right) dx$ . **[BOARD 2025]**
49. Evaluate:  $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} e^{2x} \left( \frac{1-\sin 2x}{1-\cos 2x} \right) dx$ . **[BOARD 2023]**
50. Evaluate:  $\int_0^{\frac{\pi}{4}} \frac{1}{\sin x + \cos x} dx$ . **[BOARD 2024]**
51. Evaluate:  $\int_0^{\frac{\pi}{2}} \frac{5 \sin x + 3 \cos x}{\sin x + \cos x} dx$ . **[BOARD 2025]**
52. Evaluate:  $\int_0^{\frac{\pi}{4}} \frac{x dx}{1 + \cos 2x + \sin 2x}$ . **[BOARD 2024]**

53. Evaluate:  $\int_0^{\frac{\pi}{2}} \frac{x \sin x \cos x}{\sin^4 x + \cos^4 x} dx.$  [BOARD 2023]

54. Evaluate:  $\int_0^{\frac{\pi}{2}} |\sin x - \cos x| dx.$  [BOARD 2023]

55. Evaluate:  $\int_0^{\frac{\pi}{2}} [\log(\sin x) - \log(2 \cos x)] dx.$  [BOARD 2023]

56. Evaluate:  $\int_0^{\frac{\pi}{2}} e^x \sin x dx.$  [BOARD 2023]

57. Evaluate:  $\int_0^{\frac{\pi}{2}} \sqrt{\sin x} \cos^5 x dx.$  [BOARD 2023]

58. Evaluate:  $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{\cos 2x}{1 + \cos 2x} dx.$  [BOARD 2023]

59. Evaluate:  $\int_0^{\frac{\pi}{4}} \frac{dx}{\cos^3 x \sqrt{2 \sin 2x}}.$  [BOARD 2025]

60. Evaluate:  $\int_1^3 \frac{\sqrt{4-x}}{\sqrt{x} + \sqrt{4-x}} dx.$  [BOARD 2023]

61. Evaluate:  $\int_1^4 \frac{1}{\sqrt{2x+1} - \sqrt{2x-1}} dx.$  [BOARD 2023]

62. Evaluate:  $\int_0^{\frac{\pi}{4}} \log(1 + \tan x) dx.$  [BOARD 2023]

63. Evaluate:  $\int_1^e \frac{1}{\sqrt{4x^2 - (x \log x)^2}} dx.$  [BOARD 2023]

64. Evaluate:  $\int_0^{2\pi} \frac{1}{1 + e^{\sin x}} dx.$  [BOARD 2023]

65. Evaluate:  $\int_{\log \sqrt{2}}^{\log \sqrt{3}} \frac{1}{(e^x + e^{-x})(e^x - e^{-x})} dx.$  [BOARD 2023]

66. Evaluate:  $\int_{-2}^2 \frac{x^2}{1+5^x} dx.$  [BOARD 2023]

67. Evaluate:  $\int_{-a}^a \frac{9^x}{1+9^x} dx.$  [BOARD 2023]

68. Evaluate:  $\int_0^{\pi} \frac{e^{\cos x}}{e^{\cos x} + e^{-\cos x}} dx.$  [BOARD 2024]

69. Evaluate:  $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\sin^{100} x}{\sin^{100} x + \cos^{100} x} dx.$  [BOARD 2023]

70. f and g are continuous functions on interval  $[a, b]$ . Given that  $f(a-x) = f(x)$

and  $g(x) + g(a-x) = a$ , show that  $\int_0^a f(x)g(x)dx = \frac{a}{2} \int_0^a f(x) dx.$  [BOARD 2025]

71. If  $\int_a^b x^3 dx = 0$  and  $\int_a^b x^2 dx = \frac{2}{3}$  then find the values of a and b. [BOARD 2025]

**5 Marks:**

1. Find  $\int \frac{(3 \cos x - 2) \sin x}{5 - \sin^2 x - 4 \cos x} dx$ . [BOARD 2024]

2. Find  $\int \frac{\cos x}{(4 + \sin^2 x)(5 - 4 \cos^2 x)} dx$ . [BOARD 2025]

3. Find  $\int \sin^{-1} \sqrt{\frac{x}{a+x}} dx$ . [BOARD 2025]

4. Find  $\int \sqrt{\tan x} + \sqrt{\cot x} dx$ . [BOARD 2025]

5. Find  $\int \frac{dx}{\sin x + \sin 2x}$ . [BOARD 2025]

6. Find  $\int \frac{\sqrt{x^2+1}[\log(x^2+1) - 2 \log x]}{x^2} dx$ . [BOARD 2025]

7. Find  $\int \frac{x^2+x+1}{(x+2)(x^2+1)} dx$ . [BOARD 2025]

8. Find  $\int \frac{5x}{(x+1)(x^2+9)} dx$ . [BOARD 2025]

9. Find  $\int \frac{x}{(x-1)(x^2+4)} dx$ . [BOARD 2025]

10. Find  $\int \frac{x^2+1}{(x-1)^2(x+3)} dx$ . [BOARD 2025]

11. Find  $\int \frac{x^2+1}{(x^2+2)(2x^2+1)} dx$ . [BOARD 2025]

12. Evaluate:  $\int_0^{\frac{3}{2}} |x \cos \pi x| dx$ . [BOARD 2025]

13. Evaluate:  $\int_0^{\pi} \frac{dx}{a^2 \cos^2 x + b^2 \sin^2 x}$ . [BOARD 2025]

14. Evaluate:  $\int_{-2}^2 \frac{x^3 + |x| + 1}{x^2 + 4|x| + 4} dx$ . [BOARD 2024]

15. Evaluate:  $\int_0^{\frac{\pi}{2}} \sin 2x \tan^{-1}(\sin x) dx$ . [BOARD 2023 & 2024]

16. Evaluate:  $\int_0^{\pi} \frac{x}{1 + \sin x} dx$ . [BOARD 2023]

17. Evaluate:  $\int_0^{\frac{\pi}{2}} \frac{x}{\sin x + \cos x} dx$ . [BOARD 2025]

18. Evaluate:  $\int_0^{\pi} \frac{x \tan x}{\sec x + \tan x} dx.$

[BOARD 2025]

19. Evaluate:  $\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{9 + 16 \sin 2x} dx.$

[BOARD 2024]

20. Evaluate:  $\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx.$

[BOARD 2025]

21. Evaluate:  $\int_0^{\frac{\pi}{4}} \frac{\sin x \cos x}{\cos^4 x + \sin^4 x} dx.$

[BOARD 2025]

22. Evaluate:  $\int_0^{\frac{\pi}{2}} e^x \left( \frac{1 + \sin x}{1 + \cos x} \right) dx.$

[BOARD 2024]

23. Evaluate:  $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin x + \cos x}{\sqrt{\sin 2x}} dx.$

[BOARD 2024]