

INTEGRATION❖ **IMPORTANT QUESTION**

1. Find $\int \sqrt{\tan x} (1 + \tan^2 x) dx$
2. Find $\int 3ax / (b^2 + c^2 x^2) dx$
3. Evaluate $\int e^{-1+x^{-1}} / e^x + x dx$
4. Evaluate $\int \sec^4 x \tan x dx$
5. Evaluate $\int (1 - \sin 2x) / (x + \cos^2 x) dx$
6. Evaluate $\int (x+1)(x+\log x)^2 / x dx$
7. Find $\int \cot x \cdot \log(\sin x) dx$
8. Find $\int (1 + \tan x) / (1 - \tan x) dx$
9. Find $\int (e^x + 3x)^2 (e^x + 3) dx$

❖ **Long Answer I / Long Answer II**

10. Find $\int (\sin x / (1 - \cos x)(2 - \cos x)) dx$.
11. Evaluate $\int (x / x^4 - x^2 + 1) dx$.
12. Find $\int (\cos(x+a) / \sin(x+b)) dx$.
13. Find $\int (e^x / \sqrt{5 - 4e^x - e^{2x}}) dx$.
14. Find $\int (\sin x + \cos x) / 9 + 16 \sin 2x dx$.
15. Find $\int \tan^3 x dx$

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[CLASS XII]

16. Find $\int (\sin x) / (\sin x + \cos x) dx$
17. Find $\int (\sin 2x) / (a \cos^2 x + b \sin^2 x) dx$
18. Evaluate $\int \sin^3 x dx$
19. Evaluate $\int 5^{(5x)} \cdot 5^x \cdot 5^x dx$

❖ PRACTICE QUESTION

* Very Short (Objective Type) / Short Answer Type

1. $\int \sin^6 x / \cos^8 x dx$ is equal to _____ .
2. $\int \sqrt{x} * e^{(\sqrt{x})} / \sqrt{x} dx$ equals _____ .
3. The value of λ for which $\int (4x^3 + \lambda 4x^4) / (4x^4 + x^4) dx = \log|4x^4 + x^4|$ is
(a) 1 (b) $\log_e 4$ (c) $\log_e 4 e$ (d) 4

Evaluate the following integrals in Exercises 4 to 10:

4. $\int \cos \sqrt{x} / \sqrt{x} dx$ [NCERT; Foreign 2011]
5. $\int e^{\tan^{-1} x} / (1+x^2) dx$ [NCERT; AI 2011]
6. $\int 1 / ((2-x)^2 + 1) dx$
7. $\int 1 / (x + x \log x) dx$ [NCERT]
8. $\int (e^2 x - e^{-2} x) / (e^2 x + e^{-2} x) dx$ [NCERT; Foreign 2011]
9. $\int 2x \cos^2 x dx$
10. $\int \sin(\tan^{-1} x) / (1+x^2) dx$ [NCERT]

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* Long Answer I / Long Answer II Type

Find the following integrals in Exercises 11 to 27:

11. $\int x^{(1/2)} / (x^{(1/3)} + x^{(1/2)}) dx$ [HOTS]

12. $\int \operatorname{cosec} x * \log (\operatorname{cosec} x - \cot x) dx$

13. $\int f'(ax + b) [f(ax + b)]^n dx$

14. $\int dx / (1 + \tan x)$ [NCERT]

15. $\int (1 / \sqrt{(\sin^3 x \sin(x + \alpha))}) dx$

16. $\int ((x e^x + 1)(e^x + \log x)^2) / x dx$

17. $\int (1 + \cot x) / (x + \log(\sin x)) dx$

18. $\int \sqrt{e^x - 1} dx$

19. $\int (\sin x \cos x) / (\sin^4 x + \cos^4 x) dx$

20. $\int dx / \sqrt{(x + x)}$

21. $\int \tan^4 x dx$ [NCERT]

22. $\int (\tan^4 \sqrt{x} \sec^2 \sqrt{x}) / \sqrt{x} dx$ [NCERT]

23. $\int (x^4 - x)^{1/4} / x^5 dx$ [NCERT]

24. $\int (10x^9 + 10^x \log_e 10) / (x^{10} + 10^x) dx$ [NCERT]

25. $\int dx / (e^x + e^{-x})$ [NCERT]

26. $\int \sqrt{(1 + x^2)} / x^4 dx$ [NCERT Exemplar]

27. $\int dx / (x^3 (x^5 + 1)^{3/5})$ [Guwahti 2015]

❖ INTEGRATION USING TRIGNOMETRIC IDENTITIES

1. Find $\int 2 / (1 + \cos 2x) dx$
2. Find $\int \sec^2 x / \operatorname{cosec}^2 x dx$
3. Find $\int (\cos x - \sin x)^2 dx$
4. Evaluate $\int \sqrt{(1 + \sin x/4)} dx$

❖ Long Answer I / Long Answer

5. Find $\int \tan^{-1} \sqrt{(1-\sin x / 1+\sin x)} dx$
6. Find $\int \sin x . \sin 2x . \sin 3x dx$
7. Find $\int \cos 2x - \cos 2\alpha / \cos x - \cos \alpha dx$
8. Find $\int \sin(x - \alpha) / \sin(x + \alpha) dx$
9. Evaluate $\int 1 - \cos x / 1 + \cos x dx$
10. Evaluate $\int \sin^4 2x dx$
11. Evaluate $\int dx / 1-\sin x$

* Very Short (Objective Type) / Short Answer Type

1. If $\int 1/\sqrt{4-9x^2} dx = 1/3 \sin^{-1}(ax) + C$, then value of a is
2. Evaluate $\int (1 / ((3+x)^2 + 1)) dx$
3. Evaluate $\int (1 / \sqrt{4 - x^2}) dx$
4. Evaluate $\int (1 / 4 + 9x^2) dx$
5. Find $\int (dx / x^2 + 4x + 8)$

6. Find $\int (dx / 5 - 8x - x^2)$
7. Find $\int (dx / \sqrt{3 - 2x - x^2})$
6. Find $\int (2x / (x^2+1)(x^2+2)^2) dx$
7. Find $\int (2x / (x^2+1)(x^4+4)) dx$
8. Find $\int (\cos\theta) / ((4 + \sin^2\theta)(5 - 4\cos^2\theta)) d\theta$
9. Find $\int (\sin\theta) / ((4 + \cos^2\theta)(2 - \sin^2\theta)) d\theta$
10. Find $\int e^x / ((e^x - 1)^2(e^x + 2)) dx$
11. Find $\int (e^x / (2+e^x)(4+e^x)) dx$
12. Find $\int x / ((2+x^2)(4+x^2)) dx$
13. Find $\int (2 \cos x / ((1-\sin x)(1+\sin^2 x))) dx$
14. Find $\int (x^2 / ((x^2+1)(x^2+4))) dx$

❖ **PRACTICE QUESTION**

*** Long Answer I / Long Answer II Type**

Evaluate the following integrals in exercises 1 to 9 :

1. $\int ((3x-1) / (x+2)^2) dx$ [NCERT; Foreign 2012]
2. $\int ((3x+5) / (x^3-x^2-x+1)) dx$ [NCERT; Delhi 2013 (C)]
3. $\int (1 / (x^3-1)) dx$ [HOTS]
4. $\int (1 / (e^x-1)) dx$ [NCERT]

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5. $\int \cos x / (1 + \sin x) (2 + \sin x) dx$ [NCERT; Delhi 2019]
6. $\int 1-x^2 / x(1-2x) dx$ [NCERT; Foreign 2013]
7. $\int x^2-3x / (x-1)(x-2) dx$
8. $\int x^2+1 / (x-1)^2 (x+3) dx$ [AI 2012]
9. $\int x^2 / (x^2+4)(x^2+9) dx$ [DoE; Foreign 2015; Delhi 2013]

❖ Long Answer I / Long Answer II Type

Evaluate the following integrals in Exercises 1 to 10:

1. $\int x \sin^{-1} x dx$ [Chennai 2015; HOTS]
2. $\int \tan^{-1} (2x / (1-x^2)) dx$
3. $\int x \cot^{-1} x dx$
4. $\int x^{2n-1} \cos x^n dx$
5. $\int x \sin^{-1} x^2 / \sqrt{(1-x^4)} dx$ [HOTS]
6. $\int (\sin^{-1}\sqrt{x} - \cos^{-1}\sqrt{x}) / (\sin^{-1}\sqrt{x} + \cos^{-1}\sqrt{x}) dx$ [NCERT; DoE]
7. $\int (\sin^{-1}x)^2 dx$ [NCERT]
8. $\int \sin^{-1}x / (1-x^2)^{3/2} dx$ [NCERT Exemplar]
9. $\int \sqrt{(1-\sqrt{x})} / (1+\sqrt{x}) dx$ [NCERT; DoE]
10. $\int \sqrt{(x^2+1)} [\log(x^2+1) - 2 \log x] / x^4 dx$ [NCERT; HOTS]
11. Find $\int x^3 / (x^4 + x^3) = 2 dx$
12. Find $\int (x^2 + 1) e^x / (x + 1)^2 dx$

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13. Find $\int x\sqrt{(x^4 - 1)} dx$
14. Find $\int 1 / a^2 \sin^2 x + b^2 \cos^2 x dx$
15. Find $\int \sqrt{\tan x} dx$
16. Find $\int e^x (\sin 4x - 4) / (1 - \cos 4x) dx$
17. Find $\int e^{2x} \sin x dx$
18. Find $\int e^{2x} (1 - \sin 2x) / (1 - \cos 2x) dx$
19. Find $\int dx / (\sin x + \cos x)$
20. Evaluate $\int dx / (1 + 3 \sin^2 x)$
21. Find $\int e^{2x} \sin(3x + 1) dx$
22. Evaluate $\int e^{3x} \cos(3x - 5) dx$
23. Evaluate $\int e^{5x} \sin^2 x dx$
24. $\int e^x (1-x) / (1+x^2)^2 dx$ is equal to
(a) $e^x / (1+x^2) + C$ (b) $-e^x / (1+x^2) + C$
(c) $e^x / (1+x^2)^2 + C$ (d) $e^x / (1-x^2)^2 + C$
25. $\int (x-4)e^x / (x-2)^3 dx$
26. $\int 1 / [(x-1)\sqrt{(x^2+4)}] dx$
27. $\int (2-x)e^x / (1-x)^2 dx$ [HOTS]
28. $\int dx / (\cos^2 x + \sin 2x)$ [HOTS]
29. $\int (1 / (x-3)\sqrt{x+1}) dx$
30. $\int e^{ax} \cos hx dx$

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31. $\int e^x (\tan x - \log \cos x) dx$

32. $\int dx / 1-x^4$

33. $\int e^x ((1-\sin x) / (1-\cos x)) dx$

34. $\int (x-3)\sqrt{(x^2+3x-18)} dx$

35. $\int (\tan x + \log \sec x) e^x dx$

36. $\int x\sqrt{1+x-x^2} dx$



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