PRACTICE QUESTIONS FOR COMPETITIVE EXAMINATIONS

SUB: MATHEMATICS

TOPIC 5: INDEFINITE INTEGRALS

1. If $f(x) = \int \frac{2\sin x - \sin 2x}{x^3} dx$, $x \neq 0$ then $\lim_{x \to 0} f'(x)$ is equal to-

(A) 0 (B) 1 (C) 2 (D) 1/2

2. $\int 4 \sin x \cos \frac{x}{2} \cos \frac{3x}{2} dx$ is equal to -

(A) $\cos x - \frac{1}{2}\cos 2x + \frac{1}{3}\cos 3x + c$ (B) $\cos x - \frac{1}{2}\cos 2x - \frac{1}{3}\cos 3x + c$

(C) $\cos x + \frac{1}{2}\cos 2x + \frac{1}{3}\cos 3x + c$ (D) $\cos x + \frac{1}{2}\cos 2x - \frac{1}{3}\cos 3x + c$

3. $\int \frac{8x+13}{\sqrt{4x+7}} dx$ is equal to -

(A) $\frac{1}{6}(8x + 11)\sqrt{4x+7} + c$ (B) $\frac{1}{6}(8x + 13)\sqrt{4x+7} + c$

(C) $\frac{1}{6}(8x + 9)\sqrt{4x+7} + c$ (D) $\frac{1}{6}(8x + 15)\sqrt{4x+7} + c$

4. $\int \left(\frac{\cos^8 x - \sin^8 x}{1 - 2\sin^2 x \cos^2 x} \right) dx$ equals -

(A) $-\frac{\sin 2x}{2} + c$ (B) $\frac{\sin 2x}{2} + c$ (C) $\frac{\cos 2x}{2} + c$ (D) $-\frac{\cos 2x}{2} + c$

5. Primitive of $\sqrt[3]{\frac{x}{(x^4-1)^4}}$ w.r.t. x is -

(A) $\frac{3}{4}\left(1 + \frac{1}{x^4-1}\right)^{\frac{1}{3}} + c$ (B) $-\frac{3}{4}\left(1 + \frac{1}{x^4-1}\right)^{\frac{1}{3}} + c$ (C) $\frac{4}{3}\left(1 + \frac{1}{x^4-1}\right)^{\frac{1}{3}} + c$ (D) $-\frac{4}{3}\left(1 + \frac{1}{x^4-1}\right)^{\frac{1}{3}} + c$

6. $\int (1 + 2x + 3x^2 + 4x^3 + ...) dx$ $(|x| < 1)$ -

(A) $(1 + x)^{-1} + c$ (B) $(1 - x)^{-1} + c$ (C) $(1 + x)^{-2} + c$ (D) none of these

7. $\int \frac{x \ dx}{\sqrt{1 + x^2 + \sqrt{(1+x^2)^3}}}$ is equal to -

(A) $\frac{1}{2} ln\left(1 + \sqrt{1 + x^2}\right) + c$ (B) $2\sqrt{1 + \sqrt{1 + x^2}} + c$

(C) $2\left(1 + \sqrt{1 + x^2}\right) + c$ (D) none of these

8. $\int \frac{\ell n|x|}{x\sqrt{1+\ell n|x|}}dx$ equals -

(A) $\frac{2}{3}\sqrt{1+\ell n|x|}(\ell n|x|-2)+c$ (B) $\frac{2}{3}\sqrt{1+\ell n|x|}(\ell n|x|+2)+c$

(C) $\frac{1}{3}\sqrt{1+\ell n|x|}(\ell n|x|-2)+c$ (D) $2\sqrt{1+\ell n|x|}(3\ell n|x|-2)+c$

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9. If $\int \frac{x^4+1}{x(x^2+1)^2}dx = A\ \ell n|x| + \frac{B}{1+x^2} + c$, where c is the constant of integration then :

(A) A = 1; B = –1 (B) A = –1; B = 1 (C) A = 1; B = 1 (D) A = –1 ; B = –1

10. $\int\left(\frac{x}{1+x^5}\right)^{3/2}dx$ equals -

(A) $\frac{2}{5}\sqrt{\frac{x^5}{1+x^5}}+c$ (B) $\frac{2}{5}\sqrt{\frac{x}{1+x^5}}+c$ (C) $\frac{2}{5}\frac{1}{\sqrt{1+x^5}}+c$ (D) none of these

11. $\int \sin x.\cos x.\cos 2x.\cos 4x.\cos 8x.\cos 16x\ dx$ equals -

(A) $\frac{\sin 16x}{1024}+c$ (B) $-\frac{\cos 32x}{1024}+c$ (C) $\frac{\cos 32x}{1096}+c$ (D) $-\frac{\cos 32x}{1096}+c$

12. Identify the correct expression

(A) $x\int \ell nx\,dx = x^2\ell n|x| - x^2 + c$ (B) $x\int \ell n|x|dx = xe^x + c$

(C) $x\int e^x dx = xe^x + c\,x$ (D) $\int \frac{dx}{\sqrt{a^2+x^2}} = \frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right)+c$

13. $\int x.\frac{\ell n\left(x+\sqrt{1+x^2}\right)}{\sqrt{1+x^2}}dx$ equals -

(A) $\sqrt{1+x^2}\,\ell n\left(x+\sqrt{1+x^2}\right)-x+c$ (B) $\frac{x}{2}.\ell n^2\left(x+\sqrt{1+x^2}\right)-\frac{x}{\sqrt{1+x^2}}+c$

(C) $\frac{x}{2}.\ell n^2\left(x+\sqrt{1+x^2}\right)+\frac{x}{\sqrt{1+x^2}}+c$ (D) $\sqrt{1+x^2}\,\ell n\left(x+\sqrt{1+x^2}\right)+x+c$

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14. If $\int \frac{dx}{(x+2)(x^2+1)} = a\ell n(1+x^2) + b\tan^{-1}x + \frac{1}{5}\ell n|x+2| + C$ then-

(A) $a = -\frac{1}{10}, b = -\frac{2}{5}$ (B) $a = \frac{1}{10}, b = -\frac{2}{5}$ (C) $a = -\frac{1}{10}, b = \frac{2}{5}$ (D) $a = \frac{1}{10}, b = \frac{2}{5}$

15. $\int \frac{(x-1)^2}{x^4+2x^2+1}dx$ equals -

(A) $\frac{x^3}{3}+x+\frac{x}{x^2+1}+c$ (B) $\frac{x^5+x^3+x+3}{3(x^2+1)}+c$ (C) $\frac{x^5+4x^3+3x+3}{3(x^2+1)}+c$ (D) None of these

16. $\int \frac{x^2-4}{x^4+24x^2+16}dx$ equals -

(A) $\frac{1}{4}\tan^{-1}\left(\frac{(x^2+4)}{4x}\right)+c$ (B) $-\frac{1}{4}\cot^{-1}\left(\frac{(x^2+4)}{x}\right)+c$

(C) $-\frac{1}{4}\cot^{-1}\left(\frac{4(x^2+4)}{x}\right)+c$ (D) $\frac{1}{4}\cot^{-1}\left(\frac{(x^2+4)}{x}\right)+c$

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17. $\int \frac{x^4-4}{x^2\sqrt{4+x^2+x^4}}dx$ equals-

(A) $\frac{\sqrt{4+x^2+x^4}}{x}+c$ (B) $\sqrt{4+x^2+x^4}+c$ (C) $\frac{\sqrt{4+x^2+x^4}}{2}+c$ (D) $\frac{\sqrt{4+x^2+x^4}}{2x}+c$

18. $\int \frac{x^9}{(x^2+4)^5}dx$ is equal to -

(A) $\frac{1}{5x}\left(4+\frac{1}{x^2}\right)^{-5}+c$ (B) $\frac{1}{5}\left(4+\frac{1}{x^2}\right)^{-5}+c$

(C) $\frac{1}{10x}(1+4x^2)^{-5}+c$ (D) $\frac{1}{40}(1+4x^{-2})^{-5}+c$

19. If $\int \frac{dx}{5+4\cos x} = a\tan^{-1}\left(b\tan\frac{x}{2}\right)+c$, then-

(A) $a = \frac{2}{3}, b = -\frac{1}{3}$ (B) $a = \frac{2}{3}, b = \frac{1}{3}$

(C) $a = -\frac{2}{3}, b = \frac{1}{3}$ (D) $a = -\frac{2}{3}, b = -\frac{1}{3}$

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20. Primitive of $\sqrt{1+2\tan x(\sec x+\tan x)}$ w.r.t.x is -

(A) $\ell n|\sec x|-\ell n|\sec x-\tan x|+c$ (B) $\ell n|\sec x+\tan x|+\ell n|\sec x|+c$

(C) $2\ell n\left|\sec\frac{x}{2}+\tan\frac{x}{2}\right|+c$ (D) $\ell n|1+\tan x(\sec x+\tan x)|+c$

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	B	B	A	B	B	B	B	A	C	A
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	B	C	A	C	D	A	A	D	B	A,B,D