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Class: XII
Subject: Mathematics
Topic: Indefinite Integration
No. of Questions: 26

1. If $\int \frac{e^{4x}-1}{e^{2x}} \log\left(\frac{e^{2x}+1}{e^{2x}-1}\right) dx = \frac{t^2}{2}\log t - \frac{t^2}{4} + \frac{u^2}{2}\log u - \frac{u^2}{4} + C$, then

(a) $t = e^{-x} - e^x$ $u = e^x + e^{-x}$
(b) $t = e^x - e^{-x}$, $u = e^x + e^{-x}$
(c) $t = e^x + e^{-x}$, $u = e^x - e^{-x}$
(d) none of these

2. If $\int \frac{\sqrt{1+\sqrt[3]{x}}}{x^{2/3}} dx = 2f(x)^{3/2} + C$, then f(x) is equal to

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

3. Let f and g be two polynomials. Then $\int f(x)g''(x) - f''(x)g(x)$ dx (ignoring the constant of integration) is equal to

(a) $\frac{f(x)}{g'(x)}$
(b) f '(x) g(x) – f(x) g'(x)
(c) f(x) g'(x) – f '(x) g(x)
(d) f'(x) g'(x) + f '(x) g(x)

4. Let f(x) = $\int e^x$ (x - 1)(x - 2) dx. Then f decreases in the interval

(a) $(-\infty, -2)$
(b) (– 2, – 1)
(c) (1, 2)
(d) $(2, \infty)$

5. If the primitive of $\sin^{-3/2} x \sin^{-1/2}(x + \theta)$ is $-2 \operatorname{cosec} \theta \sqrt{f(x)} + C$, then

(a) $f(x) = \dfrac{\sin x}{\sin(x + \theta)}$
(b) $f(x) = \tan(x + \theta)$
(c) $f(x) = \dfrac{\sin(x + \theta)}{\sin x}$
(d) $f(x) = \dfrac{\tan(x + \theta)}{\tan x}$

6. If $f(x) = \lim_{n \to \infty} n^2 (x^{1/n} - x^{1/(n+1)})$, $x > 0$, then $\int^x f(x)\, dx$ is equal to

(a) $x^2/2$
(b) 0
(c) $x^2 \log x - \dfrac{1}{2} x^2 + C$
(d) none of these

7. If the primitive of $\dfrac{\sin x}{\sqrt{1 + \sin x}}$ is $-2\sqrt{f(x)} + \sqrt{2} \log |\tan g(x)| + C$, then

(a) $f(x) = 1 + \sin x$
(b) $g(x) = (3\pi/8) - (x/4)$
(c) $f(x) = 2(1 - \sin x)$
(d) none of these

8. If $\dfrac{(x^2 - 1)\, dx}{(x^4 + 3x^2 + 1) \tan^{-1} \dfrac{x^2 + 1}{x}} = \log |\tan^{-1} f(x)| + C$, then

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

9. If f (x) = $\lim_{n\to\infty} e^{x \tan(1/n)\log(1/n)}$ and $\int \frac{f(x)}{\sqrt[3]{\sin^{11} x \cos x}}\, dx = g(x) + C$ (C being the constant of integration), then

(a) g(π/4) = 3/2
(b) g(x) is continuous for all x $\in$ **R**
(c) g(π/4) = -15/8
(d) g(π/4) = ½

10. If f (x) = $\lim_{n\to\infty} \frac{x^n - x^{-n}}{x^n + x^{-n}}$, 0 < x < 1, n $\in$ **N,** then $\int (\sin^{-1} x)$ f(x) dx is equal to

(a) $-[x \sin^{-1} x + \sqrt{1-x^2}] + C$
(b) $x \sin^{-1} x + \sqrt{1-x^2} + C$
(c) a constant
(d) none of these

11. If f (x) = $\lim_{n\to\infty}$ [2x + 4x^3 +…+ 2nx^{2n-1}] (0 < x < 1), then $\int f(X)$ dx is equal to

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

12. $\int \tan^2 x$ dx =

(a) 2 tan x sec^2 x + c
(b) tan x + x + c
(c) tan x - x + c
(d) None of these

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13. $\int \sqrt{1 + \cos (x/4)}\ dx =$

(a) $8 \sqrt{2} \sin (x/8) + C$
(b) $- 8 \sqrt{2} \cos (x/8) + C$
(c) $8 \left(1 + \cos \frac{x}{4}\right)^{3/4} + C$
(d) None of these

14. $\int e^{-\log x}\ dx =$

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

15. $\int | x |^3\ dx =$

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

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

(a) $x (1 - \log x) + C$
(b) $x (\log x - 1) + C$
(c) $(1 + x) \log x + C$
(d) $(1 - x) \log x + C$

17. $\int \sin^{-1} x \, dx =$

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

18. $\int \sin x \sin 2x \sin 3x \, dx =$

(a) $\frac{\cos 6x}{24} - \frac{\cos 4x}{16} - \frac{\cos 2x}{8} + C$

(b) $\frac{\cos 4x}{16} + \frac{\cos 2x}{8} - \frac{\cos 6x}{8} + C$

(c) $\frac{\sin 6x}{8} - \frac{\sin 4x}{16} - \frac{\sin 2x}{8}$

(d) none of these

19. $\int \frac{dx}{e^x + e^{-x}} =$

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

20. $\int \frac{e^{\tan^{-1} x} dx}{1 + x^2} =$

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

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

(a) g(x) f(x)
(b) 1/2 g(x) $(f(x))^2$
(c) f(x) (g(x) + g(x))
(d) None of these

22. Evaluate $\int \frac{x^2}{(x^2+4)(x^2+9)}dx.$ [Delhi 2013]

23. Evaluate $\int \frac{x^2+1}{(x^2+4)(x^2+25)}dx.$ [Delhi 2013]

24. Evaluate $\int \frac{2x}{\left(x^2+1\right)\left(x^2+3\right)}dx$ [Delhi 2011]

25. Evaluate $\int \left[\log(\log x) + \frac{1}{(\log x^2)}\right]dx.$ [Hots; Delhi 2010C]

26. Evaluate $\int \frac{dx}{\sqrt{5-4x-2x^2}}dx.$ [All India 2009]