Indefinite Integration

Subjects : Maths **Previous Year Questions**

Maths - Section A (MCQ)

1. Let $f(x)=\int\left(\frac{16x+24}{x^2+2x-15}\right)dx$. If $f(4)=14\log_e(3)$ and $f(7)=\log_e(2^\alpha\cdot 3^\beta)$, $\alpha,\beta\in\mathbb{N}$, then $\alpha+\beta$ is equal to:

A) 31 B) 37 C) 39 D) 41

2. Let $f(x)=\int\frac{dx}{x^{\left(\frac{2}{3}\right)}+2x^{\left(\frac{1}{2}\right)}}$ be such that $f(0)=-26+24\log_e(2)$. If $f(1)=a+b\log_e(3)$, where $a,b\in Z$, then $a+b$ is equal to:

A) -18 B) -5 C) -11 D) -26

3. If $\int(\frac{1-5\,cos^2x}{sin^5x\,cos^2x})dx=f(x)+C$ where C is the constant of integration, then $f(\frac{\pi}{6})-f(\frac{\pi}{4})$ is equal to

A) $\frac{1}{\sqrt{3}}(26+\sqrt{3})$ B) $\frac{4}{\sqrt{3}}(8-\sqrt{6})$ C) $\frac{1}{\sqrt{3}}(26-\sqrt{3})$ D) $\frac{2}{\sqrt{3}}(4+\sqrt{6})$

4. Let $f(t)=\int\left(\frac{1-\sin(\log_e t)}{1-\cos(\log_e t)}\right)dt, t>1$.
If $f\left(e^{\pi/2}\right)=-e^{\pi/2}$ and $f\left(e^{\pi/4}\right)=\alpha e^{\pi/4}$, then α equals

A) $-1-\sqrt{2}$ B) $-1-2\sqrt{2}$ C) $1+\sqrt{2}$ D) $-1+\sqrt{2}$

5. Let $f(x)=\int\frac{7x^{10}+9x^8}{(1+x^2+2x^9)^2}dx$, $x>0$, $\lim_{x\to 0}f(x)=0$ and $f(1)=\frac{1}{4}$. If $A=\begin{bmatrix}0 & 0 & 1\\ \frac{1}{4} & f'(1) & 1\\ \alpha^2 & 4 & 1\end{bmatrix}$ and $B=adj(adj\ A)$ be such that $|B|=81$, then α^2 is equal to

A) 2 B) 3 C) 1 D) 4

6. Let $I(x)=\int\frac{3dx}{(4x+6)(\sqrt{4x^2+8x+3})}$ and $I(0)=\frac{\sqrt{3}}{4}+20$. If $I(\frac{1}{2})=\frac{a\sqrt{2}}{b}+c$, where $a,b,c\in N$ and $gcd(a,b)=1$, then $a+b+c$ is equal to:

A) 29 B) 28 C) 31 D) 30

7. Let $f(x)=\int\frac{(2-x^2)e^x}{(\sqrt{1+x})(1-x)^{\frac{3}{2}}}dx$. If $f(0)=0$, then $f(\frac{1}{2})$ is equal to:

A) $\sqrt{3e}-1$ B) $\sqrt{2e}+1$ C) $\sqrt{2e}-1$ D) $\sqrt{3e}+1$

8. If $\int e^x\left(\frac{x\sin^{-1}x}{\sqrt{1-x^2}}+\frac{\sin^{-1}x}{(1-x^2)^{3/2}}+\frac{x}{1-x^2}\right)dx=g(x)+C$, where C is the constant of integration, then $g\left(\frac{1}{2}\right)$ equals :

A) $\frac{\pi}{4}\sqrt{\frac{e}{3}}$ B) $\frac{\pi}{6}\sqrt{\frac{e}{3}}$ C) $\frac{\pi}{4}\sqrt{\frac{e}{2}}$ D) $\frac{\pi}{6}\sqrt{\frac{e}{2}}$

9. Let $f(x)=\int x^3\sqrt{3-x^2}dx$. If $5f(\sqrt{2})=-4$, then $f(1)$ is equal to

A) $-\frac{2\sqrt{2}}{5}$ B) $-\frac{8\sqrt{2}}{5}$ C) $-\frac{4\sqrt{2}}{5}$ D) $-\frac{6\sqrt{2}}{5}$

10. If $f(x)=\int \frac{1}{x^{1/4}(1+x^{1/4})}\mathrm{d}x, f(0)=-6$, then $f(1)$ is equal to :

A) $4\left(\log_e 2-2\right)$ B) $2-\log_{e^2} 2$ C) $\log_e 2+2$ D) $4\left(\log_e 2+2\right)$

11. Let $\int x^3 \sin x \, \mathrm{d}x = g(x)+C$, where C is the constant of integration. If $8\left(g\left(\frac{\pi}{2}\right)+g'\left(\frac{\pi}{2}\right)\right)=\alpha\pi^3+\beta\pi^2+\gamma, \alpha,\beta,\gamma\in Z$, then $\alpha+\beta-\gamma$ equals :

A) 48 B) 55 C) 62 D) 47

12. Let $\mathrm{I}(x)=\int \frac{dx}{(x-11)^{\frac{11}{13}}(x+15)^{\frac{15}{13}}}$. If $\mathrm{I}(37)-\mathrm{I}(24)=\frac{1}{4}\left(\frac{1}{\mathrm{b}^{\frac{1}{13}}}-\frac{1}{\mathrm{c}^{\frac{1}{13}}}\right), \mathrm{b},\mathrm{c}\in \mathrm{N}$, then $3(\mathrm{b}+\mathrm{c})$ is equal to

A) 22 B) 39 C) 40 D) 26

13. The value of the integral $\int_{-1}^{2}\log_e\left(x+\sqrt{x^2+1}\right)dx$ is :

A) $\sqrt{5}-\sqrt{2}+\log_{\mathrm{e}}\left(\frac{9+4\sqrt{5}}{1+\sqrt{2}}\right)$ B) $\sqrt{2}-\sqrt{5}+\log_{\mathrm{e}}\left(\frac{9+4\sqrt{5}}{1+\sqrt{2}}\right)$

C) $\sqrt{5}-\sqrt{2}+\log_{\mathrm{e}}\left(\frac{7+4\sqrt{5}}{1+\sqrt{2}}\right)$ D) $\sqrt{2}-\sqrt{5}+\log_{\mathrm{e}}\left(\frac{7+4\sqrt{5}}{1+\sqrt{2}}\right)$

14. Let $\int \frac{2-\tan x}{3+\tan x}dx=\frac{1}{2}\left(\alpha x+\log_e|\beta\sin x+\gamma\cos x|\right)+C$, where C is the constant of integration. Then $\alpha+\frac{\gamma}{\beta}$ is equal to :

A) 3 B) 1 C) 4 D) 7

15. Let $I(x)=\int \frac{6}{\sin^2 x(1-\cot x)^2}dx$. If $I(0)=3$, then $\mathrm{I}\left(\frac{\pi}{12}\right)$ is equal to :

A) $\sqrt{3}$ B) $3\sqrt{3}$ C) $6\sqrt{3}$ D) $2\sqrt{3}$

16. If $\int \frac{1}{a^2\sin^2 x+b^2\cos^2 x}dx=\frac{1}{12}\tan^{-1}(3\tan x)+$ constant, then the maximum value of $\mathrm{a}\sin\mathrm{x}+\mathrm{b}\cos\mathrm{x}$, is :

A) $\sqrt{40}$ B) $\sqrt{39}$ C) $\sqrt{42}$ D) $\sqrt{41}$

17. If $\int \frac{\sin^{\frac{3}{2}}x+\cos^{\frac{3}{2}}x}{\sqrt{\sin^3 x\cos^3 x\sin(x-\theta)}}dx = A\sqrt{\cos\theta\tan x-\sin\theta}+B\sqrt{\cos\theta-\sin\theta\,\mathrm{coc}\,x}+C$, where C is the integration constant, then AB is equal to

A) $4\,\mathrm{cosec}(2\theta)$ B) $4\sec\theta$ C) $2\sec\theta$ D) $8\,\mathrm{cosec}(2\theta)$

18. For $\mathrm{x}\in\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$, if $y(x)=\int \frac{\mathrm{cosec}\,x+\sin x}{\mathrm{cosec}\,x\sec x+\tan x\sin^2 x}dx$ and $\lim_{x\to(\frac{\pi}{2})^-}y(x)=0$ then $y\left(\frac{\pi}{4}\right)$ is equal to

A) $\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$ B) $\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$ C) $-\frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$ D) $\frac{1}{\sqrt{2}}\tan^{-1}\left(-\frac{1}{2}\right)$

19. The integral $\int \frac{(x^8-x^2)dx}{(x^{12}+3x^6+1)\tan^{-1}\left(x^3+\frac{1}{x^3}\right)}$ is equal to :

A) $\log_e\left(\left|\tan^{-1}\left(\mathrm{x}^3+\frac{1}{\mathrm{x}^3}\right)\right|\right)^{1/3}+\mathrm{C}$ B) $\log_e\left(\left|\tan^{-1}\left(x^3+\frac{1}{x^3}\right)\right|\right)^{1/2}+C$

C) $\log_e\left(\left|\tan^{-1}\left(x^j+\frac{1}{x^j}\right)\right|\right)+C$ D) $\log_e\left(\left|\tan^{-1}\left(x^3+\frac{1}{x^3}\right)\right|\right)^3+C$

20. If $I(x)=\int e^{\sin^2 x}(\cos x\sin 2x-\sin x)dx$ and $I(0)=1$, then $I\left(\frac{\pi}{3}\right)$ is equal to

A) $-\frac{1}{2}e^{\frac{3}{4}}$ B) $e^{\frac{3}{4}}$ C) $\frac{1}{2}e^{\frac{3}{4}}$ D) $-e^{\frac{3}{4}}$

21. The integral $\int\left(\left(\frac{x}{2}\right)^x+\left(\frac{2}{x}\right)^x\right)\log_2 x dx$ is equal to

A) $\left(\frac{x}{2}\right)^x+\left(\frac{2}{x}\right)^x+C$ B) $\left(\frac{x}{2}\right)^x-\left(\frac{2}{x}\right)^x+C$ C) $\left(\frac{x}{2}\right)^x\log_2\left(\frac{x}{2}\right)+C$ D) $\left(\frac{x}{2}\right)^x\log_2\left(\frac{2}{x}\right)+C$

22. Let $I(x)=\int \frac{(x+1)}{x(1+xe^x)^2}dx, x>0$, If $\lim_{x\to\infty}I(x)=0$, then $I(1)$ is equal to

A) $\frac{e+1}{e+2}-\log_e(e+1)$ B) $\frac{e+1}{e+2}+\log_e(e+1)$

C) $\frac{e+2}{e+1}+\log_e(e+1)$ D) $\frac{e+2}{e+1}-\log_e(e+1)$

23. Let $I(x)=\int \frac{x^2(x\sec^2 x+\tan x)}{(x\tan x+1)^2}dx$. If $I(0)=0$ the $I\left(\frac{\pi}{4}\right)$ is equal to

A) $\log_e \frac{(x+4)^2}{16}-\frac{\pi^2}{4(\pi+4)}$ B) $\log_e \frac{(x+4)^2}{16}+\frac{\pi^2}{4(\pi+4)}$ C) $\log_e \frac{(x+4)^2}{32}-\frac{\pi^2}{4(\pi+4)}$ D) $\log_e \frac{(x+4)^2}{32}+\frac{\pi^2}{4(\pi+4)}$

24. If $\int \sqrt{\sec 2x-1}dx=\alpha\log_e\left|\cos 2x+\beta+\sqrt{\cos 2x\left(1+\cos\frac{1}{\beta}x\right)}\right|+$ constant, then $\beta-\alpha$ is equal to

A) 0.5 B) 1 C) 10 D) 100

25. Let $f(x)=\int \frac{2x}{(x^2+1)(x^2+3)}dx$. If $f(3)=\frac{1}{2}(\log_e 5-\log_e 6)$, then $f(4)$ is equal to

A) $\frac{1}{2}(\log_e 17-\log_e 19)$ B) $\log_e 17-\log_e 18$ C) $\frac{1}{2}(\log_e 19-\log_e 17)$ D) $\log_e 19-\log_e 20$

26. For $I(x)=\int \frac{\sec^2 x-2022}{\sin^{2022}x}dx$, if $I\left(\frac{\pi}{4}\right)=2^{1011}$, then

A) $3^{1010}I\left(\frac{\pi}{3}\right)-I\left(\frac{\pi}{6}\right)=0$ B) $3^{1010}I\left(\frac{\pi}{6}\right)-I\left(\frac{\pi}{3}\right)=0$ C) $3^{1011}I\left(\frac{\pi}{3}\right)-I\left(\frac{\pi}{6}\right)=0$ D) $3^{1011}I\left(\frac{\pi}{6}\right)-I\left(\frac{\pi}{3}\right)=0$

27. The integral $\int \frac{\left(1-\frac{1}{\sqrt{3}}\right)(\cos x-\sin x)}{\left(1+\frac{2}{\sqrt{3}}\sin 2x\right)}dx$ is equal to

A) $\frac{1}{2}\log_c\left|\frac{\tan\left(\frac{x}{2}+\frac{\pi}{12}\right)}{\left(\frac{x}{2}+\frac{\pi}{6}\right)}\right|+C$ B) $\frac{1}{2}\log_e\left|\frac{\tan\left(\frac{x}{2}+\frac{\pi}{6}\right)}{\left(\frac{x}{2}+\frac{\pi}{3}\right)}\right|+C$ C) $\log_c\left|\frac{\tan\left(\frac{x}{2}+\frac{\pi}{6}\right)}{\tan\left(\frac{x}{2}+\frac{\pi}{12}\right)}\right|+C$ D) $\frac{1}{2}\log_c\left|\frac{\tan\left(\frac{x}{2}-\frac{\pi}{12}\right)}{\tan\left(\frac{x}{2}-\frac{\pi}{6}\right)}\right|+C$

28. $\int \frac{(x^2+1)e^x}{(x+1)^2}dx=f(x)e^x+C$, Where C is a constant, then $\frac{d^3f}{dx^3}$ at $x=1$ is equal to

A) $\frac{3}{4}$ B) $-\frac{3}{4}$ C) $-\frac{3}{2}$ D) $\frac{3}{2}$

29. If $\int \frac{1}{x}\sqrt{\frac{1-x}{1+x}}dx=g(x)+c, g(1)=0$, then $g\left(\frac{1}{2}\right)$ is equal to

A) $\log_e\left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right)+\frac{\pi}{3}$ B) $\log_e\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right)+\frac{\pi}{3}$ C) $\log_e\left(\frac{\sqrt{3}+1}{\sqrt{3}-1}\right)-\frac{\pi}{3}$ D) $\frac{1}{2}\log_e\left(\frac{\sqrt{3}-1}{\sqrt{3}+1}\right)-\frac{\pi}{6}$

30. The integral $\int \frac{1}{\sqrt[4]{(x-1)^3(x+2)^5}}dx$ is equal to :
(where C is a constant of integration)

A) $\frac{3}{4}\left(\frac{x+2}{x-1}\right)^{\frac{1}{4}}+C$ B) $\frac{3}{4}\left(\frac{x+2}{x-1}\right)^{\frac{5}{4}}+C$ C) $\frac{4}{3}\left(\frac{x-1}{x+2}\right)^{\frac{1}{4}}+C$ D) $\frac{4}{3}\left(\frac{x-1}{x+2}\right)^{\frac{5}{4}}+C$

31. If $\int \frac{\cos x-\sin x}{\sqrt{8-\sin 2x}}dx=a\sin^{-1}\left(\frac{\sin x+\cos x}{b}\right)+c$ where c is a constant of integration, then the ordered pair (a,b) is equal to

A) $(-1,3)$ B) $(3,1)$ C) $(1,3)$ D) $(1,-3)$

32. If $\int \left(e^{2x}+2e^x-e^{-x}-1\right)e^{(e^x+e^{-x})}dx=g(x)e^{(e^x+e^{-x})}+c$, where c is a constant of integration, then $g(0)$ is equal to

A) 2 B) e^2 C) e D) 1

33. If $\int \frac{\cos\theta}{5+7\sin\theta-2\cos^2\theta}d\theta=A\log_e|B(\theta)|+C$ where C is a constant of integration, then $\frac{B(\theta)}{A}$ can be

A) $\frac{2\sin\theta+1}{5(\sin\theta+3)}$ B) $\frac{2\sin\theta+1}{\sin\theta+3}$ C) $\frac{5(\sin\theta+3)}{2\sin\theta+1}$ D) $\frac{5(2\sin\theta+1)}{\sin\theta+3}$

34. $\int \frac{2x^{12}+5x^9}{\left(x^5+x^3+1\right)^3}dx=$

A) $\frac{x^5}{2\left(x^5+x^3+1\right)^2}+c$ B) $\frac{-x^{10}}{2\left(x^5+x^3+1\right)^2}+c$ C) $\frac{-x^5}{\left(x^5+x^3+1\right)^2}+c$ D) $\frac{x^{10}}{2\left(x^5+x^3+1\right)^2}+c$

35. If $\int \frac{dx}{\cos^3 x\sqrt{2\sin 2x}}=(\tan x)^A+C(\tan x)^B+k$, where k is a constant of integration, then $A+B+C$ equals

A) $\frac{16}{5}$ B) $\frac{27}{10}$ C) $\frac{7}{10}$ D) $\frac{21}{5}$

36. Let $I_n = \int \tan^n x dx, (n > 1)$. $I_4 + I_6 = a\tan^5 x + bx^5 + C$, where C is constant of integration , then ordered pair (a, b) equal to :

A) $\left(-\frac{1}{5}, 0\right)$ B) $\left(-\frac{1}{5}, 1\right)$ C) $\left(\frac{1}{5}, 0\right)$ D) $\left(\frac{1}{5}, -1\right)$

37. $\int \frac{\sin^2 x\cos^2 x}{\left(\sin^5 x+\cos^3 x\sin^2 x+\sin^3 x\cos^2 x+\cos^5 x\right)^2} dx$

A) $\frac{-1}{3(1+\tan^3 x)} + c$ B) $\frac{1}{1+\cot^3 x} + c$ C) $\frac{-1}{1+\cot^3 x} + c$ D) $\frac{-1}{3(1+\tan^3 x)} + c$

38. The integral $\int \sec^{2/3} x \ \cos ec^{4/3} x \, dx$ is equal to : (Here C is a constant of integration)

A) $3\tan^{-1/3} x + C$ B) $-\frac{3}{4}\tan^{-4/3} x + C$ C) $-3\cot^{-1/3} x + C$ D) $-3\tan^{-1/3} x + C$

Maths - Section B (Numeric)

39. For, $\alpha, \beta, \gamma, \delta \in N$, if
$\int \left(\left(\frac{x}{e}\right)^{2x} + \left(\frac{e}{x}\right)^{2x}\right) \log_e x dx = \frac{1}{\alpha}\left(\frac{x}{e}\right)^{\beta x} - \frac{1}{\gamma}\left(\frac{e}{x}\right)^{\delta x} + C$,
Where $e = \sum_{n=0}^{\infty} \frac{1}{n!}$ and C is constant of integration, then $\alpha + 2\beta + 3\gamma - 4\delta$ is equal to:

40. Let $I(x) = \int \sqrt{\frac{x+7}{x}} dx$ and $I(9) = 12 + 7\log_e 7$ If I $(1) = \alpha + 7\log_e(1 + 2\sqrt{2})$, then α^4 is equal to .....

41. Let $f(x) = \int \frac{dx}{(3+4x^2)\sqrt{4-3x^2}}, |x| < \frac{2}{\sqrt{3}}$. If $f(0) = 0$ and $f(1) = \frac{1}{\alpha\beta}\tan^{-1}\left(\frac{\alpha}{\beta}\right), \alpha, \beta > 0$, then $\alpha^2 + \beta^2$ is equal to .....

42. If $\int \text{cosec}^5 x dx = \alpha \cot x \,\text{cosec}\, x \left(\text{cosec}^2 x + \frac{3}{2}\right) + \beta \log_e \left|\tan \frac{x}{2}\right| + C$ where $\alpha, \beta \in \mathbb{R}$ and C is constant of integration , then the value of $8(\alpha + \beta)$ equals .....

43. If $\int \frac{1}{\sqrt[5]{(x-1)^4(x+3)^6}} dx = A\left(\frac{\alpha x-1}{\beta x+3}\right)^B + C$, where C is the constant of integration, then the value of $\alpha + \beta + 20$AB is .....

44. If $\int \frac{2x^2+5x+9}{\sqrt{x^2+x+1}}\, dx = x\sqrt{x^2+x+1} + \alpha\sqrt{x^2+x+1} + \beta \log_e \left|x + \frac{1}{2} + \sqrt{x^2+x+1}\right| + C$, where C is the constant of integration, then $\alpha + 2\beta$ is equal to _____.

45. If $\int \left(\frac{1}{x} + \frac{1}{x^3}\right)\left(\sqrt[23]{3x^{-24} + x^{-26}}\right) dx = -\frac{\alpha}{3(\alpha+1)}\left(3x^\beta + x^\gamma\right)^{\frac{\alpha+1}{\alpha}} + C, x > 0, (\alpha, \beta, \gamma \in Z)$, where C is the constant of integration, then $\alpha + \beta + \gamma$ is equal to _____ .

46. If $\int \frac{\left(\sqrt{1+x^2}+x\right)^{10}}{\left(\sqrt{1+x^2}-x\right)^9} dx =$
$\frac{1}{m}\left(\left(\sqrt{1+x^2}+x\right)^n \left(n\sqrt{1+x^2} - x\right)\right) + C$
where C is the constant of integration and $m, n \in N$, then m + n is equal to

47. If $\int (\sin x)^{\frac{-11}{2}} (\cos x)^{\frac{-5}{2}} dx = -\frac{p_1}{q_1}(\cot x)^{\frac{9}{2}} - \frac{p_2}{q_2}(\cot x)^{\frac{5}{2}} - \frac{p_3}{q_3}(\cot x)^{\frac{1}{2}} + \frac{p_4}{q_4}(\cot x)^{\frac{-3}{2}} + C$,where p_i and q_i are positive integers with $\gcd(p_i, q_i) = 1$ for $i = 1, 2, 3, 4$ and C is the constant of integration, then $\frac{15p_1p_2p_3p_4}{q_1q_2q_3q_4}$ is equal to ___ .

48. If $\int \frac{dx}{(x^2+x+1)^2} = a\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right) + b\left(\frac{2x+1}{x^2+x+1}\right) + C \ x > 0$ where C is the constant of integration, then the value of $9(\sqrt{3}\text{a} + \text{b})$ is equal to ... .

49. If $\int \frac{2e^x+3e^{-x}}{4e^x+7e^{-x}} dx = \frac{1}{14}\left(ux + v\log_c\left(4e^x + 7e^{-x}\right)\right) + C$ where C is a constant of integration, then u + v is equal to .... .

50. If $\int \frac{\sin x}{\sin^3 x+\cos^3 x}dx =$
$\alpha \log_e |1+\tan x| + \beta \log_c |1-\tan x+\tan^2 x| + \gamma \tan^{-1}\left(\frac{2\tan x-1}{\sqrt{3}}\right) + C$
when C is constant of integration, then the value of $18(\alpha+\beta+\gamma^2)$ is .... .

TARUN CLASSES MATHEMATICS

Indefinite Integration

Subjects : Maths **Previous Year Questions**

Maths - Section A (MCQ)

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11 - B	12 - B	13 - B	14 - C	15 - B	16 - A	17 - D	18 - D	19 - A	20 - C
21 - B	22 - D	23 - C	24 - B	25 - A	26 - A	27 - A	28 - A	29 - A	30 - C
31 - C	32 - A	33 - D	34 - D	35 - A	36 - C	37 - A	38 - D		

Maths - Section B (Numeric)

39 - 4	40 - 64	41 - 28	42 - 1	43 - 7	44 - 16	45 - 19	46 - 379	47 - 16	48 - 15
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