



## CTQ - 2023

### CTQ : Concept Through Questions

**Year : 2023**

#### Topic : Indefinite Integration

1. Let  $f(x) = \int \frac{1}{(1+x^2)^{\frac{3}{2}}} dx$  and  $f(0) = 0$ , then  $f(1) =$ 
  - (a)  $-1/\sqrt{2}$
  - (b)  $1/\sqrt{2}$
  - (c)  $\sqrt{2}$
  - (d) None of these[Video Solution](#)
  
2.  $\int e^{\sin \theta} [\log \sin \theta + \operatorname{cosec}^2 \theta] \cos \theta d\theta$  is equal to
 

|  |  |
|--|--|
| (a) $e^{\sin \theta} [\log \sin \theta + \operatorname{cosec}^2 \theta] + c$ | (b) $e^{\sin \theta} [\log \sin \theta + \operatorname{cosec} \theta] + c$   |
| (c) $e^{\sin \theta} [\log \sin \theta - \operatorname{cosec} \theta] + c$   | (d) $e^{\sin \theta} [\log \sin \theta - \operatorname{cosec}^2 \theta] + c$ |

[Video Solution](#)
  
3.  $\int \frac{10x^9 + 10^x \log_e 10}{10^x + x^{10}} dx$  is equal to
 

|                                |                               |
|--------------------------------|-------------------------------|
| (a) $10^x - x^{10} + c$        | (b) $10^x + x^{10} + c$       |
| (c) $(10^x - x^{10})^{-1} + c$ | (d) $\log(10^x + x^{10}) + c$ |

[Video Solution](#)
  
4.  $\int \frac{x-1}{(x+1)\sqrt{x^3+x^2+x}} dx$  is equal to
 

|  |  |
|--|--|
| (a) $\tan^{-1} \frac{\sqrt{x^2+x+1}}{x} + C$   | (b) $2 \tan^{-1} \frac{\sqrt{x^2+x+1}}{x}$ |
| (c) $3 \tan^{-1} \frac{\sqrt{x^2+x+1}}{x} + C$ | (d) None of these                          |

[Video Solution](#)
  
5.  $\int (x+1)(x+2)^7(x+3) dx$  is equal to
 

|   |   |
|---|---|
| (a) $\frac{(x+2)^{10}}{10} - \frac{(x+2)^8}{8} + c$ | (b) $\frac{(x+1)^2}{2} - \frac{(x+2)^8}{8} - \frac{(x+3)^2}{2} + c$ |
| (c) $\frac{(x+2)^{10}}{10} + c$                     | (d) $\frac{(x+1)^2}{2} + \frac{(x+2)^8}{8} + \frac{(x+3)^2}{2} + c$ |

[Video Solution](#)
  
6.  $\int \frac{1+\tan^2 x}{1-\tan^2 x} dx$  is equal to
 

|   |   |
|---|---|
| (a) $\log \left( \frac{1-\tan x}{1+\tan x} \right) + c$             | (b) $\log \left( \frac{1+\tan x}{1-\tan x} \right) + c$             |
| (c) $\frac{1}{2} \log \left( \frac{1-\tan x}{1+\tan x} \right) + c$ | (d) $\frac{1}{2} \log \left( \frac{1+\tan x}{1-\tan x} \right) + c$ |

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7. If  $\int \frac{\log(x+\sqrt{1+x^2})}{\sqrt{1+x^2}} dx = gof(x) + \text{constant}$ , then
 

|  |  |
|--|--|
| a) $f(x) = \log(x + \sqrt{x^2 + 1})$                             | (b) $f(x) = \log(x + \sqrt{x^2 + 1})$ and $g(x) = x^2$           |
| (c) $f(x) = \log(x + \sqrt{x^2 + 1})$ and $g(x) = \frac{x^2}{2}$ | (d) $f(x) = \frac{x^2}{2}$ and $g(x) = \log(x + \sqrt{x^2 + 1})$ |

[Video Solution](#)
  
8.  $\int \frac{\sin 2x}{1+\cos^2 x} dx$  is equal to
 

|   |                                |
|---|--------------------------------|
| (a) $-\frac{1}{2} \log(1 + \cos^2 x) + c$ | (b) $2 \log(1 + \cos^2 x) + c$ |
| (c) $\frac{1}{2} \log(1 + \cos 2x) + c$   | (d) $c - \log(1 + \cos^2 x)$   |

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



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- (a)  $\frac{1}{\sqrt{3}} \tan^{-1} \left( \frac{x}{\sqrt{3(x+1)}} \right)$       (b)  $\frac{2}{\sqrt{3}} \tan^{-1} \left( \frac{x}{\sqrt{3(x+1)}} \right)$   
 (c)  $\frac{2}{\sqrt{3}} \tan^{-1} \left( \frac{x}{\sqrt{x+1}} \right)$       (d) None of these      [Video Solution](#)
10.  $\int \frac{dx}{x(x^{n+1})}$  is equal to  
 (a)  $\frac{1}{n} \log \left( \frac{x^n}{x^{n+1}} \right) + C$       (b)  $\frac{1}{n} \log \left( \frac{x^{n+1}}{x^n} \right) + C$   
 (c)  $\log \left( \frac{x^n}{x^{n+1}} \right) + C$       (d) None of the above      [Video Solution](#)
11.  $\int \log_{10} x \, dx$  is:  
 (a)  $x(\log_{10} x - \log_{10} e) + C$       (b)  $\log_e 10 \cdot x \log_e \left( \frac{x}{e} \right) + C$   
 (c)  $\log_{10} e \cdot x \log_e \left( \frac{x}{e} \right) + C$       (d)  $\frac{1}{x} + C$       [Video Solution](#)  
 [NIMCET 2013]
12. If  $\int \frac{xe^x}{\sqrt{1+e^x}} \, dx = f(x)\sqrt{1+e^x} - 2 \log \frac{\sqrt{1+e^x}-1}{\sqrt{1+e^x+1}} + C$ , then  $f(x)$  is  
 (a)  $2x - 1$       (b)  $2x - 4$       (c)  $x + 4$       (d)  $x - 4$       [Video Solution](#)  
 [NIMCET 2014]
13. The value of  $\int \frac{(x+1)}{x(xe^x+1)} \, dx$  is equal to  
 (a)  $\log \left[ \frac{1+xe^x}{xe^x} \right] + C$       (b)  $\log[xe^x(1+e^x)] + C$   
 (c)  $\log \left[ \frac{1}{1+xe^x} \right] + C$       (d)  $\log \left| \frac{xe^x}{1+xe^x} \right| + C$       [Video Solution](#)  
 [NIMCET 2014]
14. The value of  $\int \sqrt{x} e^{\sqrt{x}} \, dx$  is equal to  
 (a)  $2\sqrt{x} - e^{\sqrt{x}} - 4\sqrt{x}e^{\sqrt{x}} + C$       (b)  $(2x - 4\sqrt{x} + 4)e^{\sqrt{x}} + C$   
 (c)  $(2x + 4\sqrt{x} + 4)e^{\sqrt{x}} + C$       (d)  $(1 - 4\sqrt{x})e^{\sqrt{x}} + C$       [Video Solution](#)  
 [NIMCET 2014]
15. If  $\int e^x(f(x) - f'(x)) \, dx = \phi(x)$ , then the value of  $\int e^x f(x) \, dx$  is  
 (a)  $\phi(x) + e^x f(x)$       (b)  $\phi(x) - e^x f(x)$   
 (c)  $\frac{1}{2}[\phi(x) + e^x f(x)]$       (d)  $\frac{1}{2}[\phi(x) + e^x f'(x)]$       [Video Solution](#)  
 [NIMCET 2015]
16.  $\int \left\{ \frac{\log(x-1)}{1+(\log x)^2} \right\}^2 \, dx$  is equal to  
 (a)  $\frac{xe^x}{1+x^2} + C$       (b)  $\frac{x}{(\log x)^2+1} + C$   
 (c)  $\frac{\log x}{(\log x)^2+1} + C$       (d)  $\frac{x}{x^2+1} + C$       [Video Solution](#)  
 [NIMCET 2016]
17.  $\int \frac{x^2-1}{x^3\sqrt{2x^4-2x^2+1}} \, dx$  is equal to  
 (a)  $\frac{\sqrt{2x^4-2x^2+1}}{x^2} + C$       (b)  $\frac{\sqrt{2x^4-2x^2+1}}{x^3} + C$



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(c)  $\frac{\sqrt{2x^4-2x^2+1}}{x} + C$

(d)  $\frac{\sqrt{2x^4-2x^2+1}}{2x^2} + C$

[Video Solution](#)

[NIMCET 2022, 2016]

18. The integral  $\int \sqrt{1 + 2 \cot x (\cosec x + \cot x)} dx$ , ( $0 < x < \pi/2$ ) (where C is a constant of integration) is equal to

(a)  $2 \log\left(\sin\frac{x}{2}\right) + C$

(b)  $2 \log\left(\cos\frac{x}{2}\right) + C$

(c)  $4 \log\left(\cos\frac{x}{2}\right) + C$

(d)  $4 \log\left(\sin\frac{x}{2}\right) + C$

[Video Solution](#)

[NIMCET 2019]

19. If  $\int \cos x \cos 2x \cos 5x dx = A_1 \sin 2x + A_2 \sin 4x + A_3 \sin 6x + A_4 \sin 8x + c$ , then the values of  $A_1, A_2, A_3, A_4$  are

(a)  $A_1 = \frac{1}{2}, A_2 = \frac{1}{4}, A_3 = \frac{1}{6}, A_4 = \frac{1}{8}$

(b)  $A_1 = \frac{1}{8}, A_2 = \frac{1}{16}, A_3 = \frac{1}{24}, A_4 = \frac{1}{32}$

(c)  $A_1 = \frac{1}{6}, A_2 = \frac{1}{12}, A_3 = \frac{1}{18}, A_4 = \frac{1}{24}$

(d)  $A_1 = \frac{1}{4}, A_2 = \frac{1}{8}, A_3 = \frac{1}{12}, A_4 = \frac{1}{16}$

[Video Solution](#)

[NIMCET 2019]

20. Evaluate  $\int e^x \left( \frac{1+\sin x \cos x}{\cos^2 x} \right) dx$

(a)  $e^x \cos x + C$

(b)  $e^x \sec x \tan x + C$

(c)  $e^x \tan x + C$

(d)  $e^x \cos^2 x - 1 + C$

[Video Solution](#)

[NIMCET 2020]

21. If  $\int \sec^2 x \cosec^4 x dx = -\frac{1}{3} \cot^3 x + k \tan x - 2 \cot x + C$ , the value of k is

(a) 1

(b) 2

(c) 3

(d) 4

[Video Solution](#)

[NIMCET 2020]

22.  $\int 3^{3^{3^x}} \cdot 3^{3^x} \cdot 3^x dx$  is equal to

(a)  $\frac{3^{3^x} \cdot 3^x}{(\log 3)^3} + C$

(b)  $\frac{3^x}{(\log 3)^3} + C$

(c)  $\frac{3^{3^x}}{(\log 3)^3} + C$

(d)  $\frac{3^{3^{3^x}}}{(\log 3)^3} + C$

[Video Solution](#)

[NIMCET 2021]

23.  $\int e^x (\sin hx + \cos hx) dx = ?$

(a)  $e^x \operatorname{sech} hx + C$

(b)  $e^x \cos hx + C$

(c)  $\sin h2x + C$

(d)  $\cosh 2x + C$

[Video Solution](#)

[NIMCET 2021]

24. The value of  $\int \frac{(x^2-1)dx}{x^3 \sqrt{2x^4-2x^2+1}}$  is

(a)  $2 \sqrt{2 - \frac{2}{x^2} + \frac{1}{x^4}} + C$

(b)  $2 \sqrt{2 + \frac{2}{x^2} + \frac{1}{x^4}} + C$

(c)  $\frac{1}{2} \sqrt{2 - \frac{2}{x^2} + \frac{1}{x^4}} + C$

(d)  $\frac{1}{2} \sqrt{2 + \frac{2}{x^2} - \frac{1}{x^4}} + C$

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[NIMCET 2022,2016]



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## Answer Key

| Ques. | 1   | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
|-------|-----|----|----|----|----|----|----|----|----|----|
| Ans.  | B   | C  | D  | D  | A  | D  | C  | D  | B  | A  |
| Ques. | 11  | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Ans.  | A,C | B  | D  | B  | C  | B  | D  | A  | D  | C  |
| Ques. | 21  | 22 | 23 | 24 |    |    |    |    |    |    |
| Ans.  | A   | D  | B  | C  |    |    |    |    |    |    |