CUET (UG) – MATHEMATICS

Chapter Test - Unit III: Calculus - Integrals

General Instructions

1. Total Questions: **20**
2. Duration: **60 Minutes**
3. All questions are compulsory.
4. Each question carries **5 marks**.
5. For each correct answer: **+5 marks**.
6. For each incorrect answer: **-1 mark**.
7. No negative marking for unanswered questions.
8. Use of calculator or electronic devices is strictly prohibited.
9. Choose the most appropriate answer from the given options.

1. The value of $\int \frac{dx}{x^2+25}$ is:
   (A) $\frac{1}{5}\tan^{-1}\left(\frac{x}{5}\right)+C$
   (B) $\tan^{-1}\left(\frac{x}{5}\right)+C$
   (C) $\frac{1}{5}\log\left|\frac{x-5}{x+5}\right|+C$
   (D) $\frac{1}{2}\tan^{-1}\left(\frac{x}{5}\right)+C$

2. $\int \frac{x^2}{1+x^6}dx$ is equal to:
   (A) $\frac{1}{3}\tan^{-1}(x^3)+C$
   (B) $\tan^{-1}(x^3)+C$
   (C) $\frac{1}{3}\log|1+x^6|+C$
   (D) $\frac{1}{2}\tan^{-1}(x^2)+C$

3. The integral $\int \frac{\sin x}{\cos^2 x}dx$ is:
   (A) $\sec x+C$
   (B) $\tan x+C$
   (C) $-\sec x+C$
   (D) $\log|\cos x|+C$

4. $\int e^x(x^2+2x)dx$ is equal to:
   (A) x^2e^x+C
   (B) $2xe^x+C$
   (C) $e^x(x^2-2x)+C$
   (D) e^x+C

5. The value of $\int \frac{dx}{\sqrt{16-9x^2}}$ is:
   (A) $\frac{1}{3}\sin^{-1}\left(\frac{3x}{4}\right)+C$
   (B) $\frac{1}{4}\sin^{-1}\left(\frac{3x}{4}\right)+C$
   (C) $\sin^{-1}\left(\frac{3x}{4}\right)+C$
   (D) $\frac{1}{3}\cos^{-1}\left(\frac{3x}{4}\right)+C$

6. $\int \frac{x+2}{x+1}dx$ is equal to:
   (A) $x+\log|x+1|+C$
   (B) $\log|x+1|+C$
   (C) $x-\log|x+1|+C$
   (D) $2x+\log|x+1|+C$

7. $\int \frac{dx}{x\log x}$ is:
   (A) $\log|x|+C$
   (B) $\log|\log x|+C$
   (C) $(\log x)^2+C$
   (D) $\frac{1}{\log x}+C$

8. If $\int \frac{1}{\sqrt{x^2+a^2}}dx=\log|x+\sqrt{x^2+a^2}|+C$, then $\int \frac{dx}{\sqrt{x^2+2x+5}}$ is:
   (A) $\log|(x+1)+\sqrt{x^2+2x+5}|+C$
   (B) $\log|x+\sqrt{x^2+2x+5}|+C$
   (C) $\sin^{-1}\left(\frac{x+1}{2}\right)+C$
   (D) $\frac{1}{2}\tan^{-1}\left(\frac{x+1}{2}\right)+C$

9. $\int xe^{2x}dx$ is:
   (A) $\frac{xe^{2x}}{2}-\frac{e^{2x}}{4}+C$

(B) $\frac{xe^{2x}}{2} + \frac{e^{2x}}{4} + C$
(C) $xe^{2x} - e^{2x} + C$
(D) $\frac{e^{2x}}{2}(x-1) + C$

10. $\int \frac{\sin(\tan^{-1} x)}{1+x^2} dx$ is equal to:
(A) $-\cos(\tan^{-1} x) + C$
(B) $\cos(\tan^{-1} x) + C$
(C) $\tan^{-1}(\sin x) + C$
(D) $\sin(\tan^{-1} x) + C$

11. $\int \frac{dx}{x^2-25}$ is:
(A) $\frac{1}{10} \log \left|\frac{x-5}{x+5}\right| + C$
(B) $\frac{1}{5} \log \left|\frac{x-5}{x+5}\right| + C$
(C) $\frac{1}{10} \log \left|\frac{x+5}{x-5}\right| + C$
(D) $\frac{1}{5} \tan^{-1}\left(\frac{x}{5}\right) + C$

12. $\int \tan^2 x dx$ is:
(A) $\tan x - x + C$
(B) $\tan x + x + C$
(C) $\sec x + C$
(D) $\frac{\tan^3 x}{3} + C$

13. $\int \frac{dx}{x(x^5+1)}$ is:
(A) $\frac{1}{5} \log \left|\frac{x^5}{x^5+1}\right| + C$
(B) $\log \left|\frac{x^5}{x^5+1}\right| + C$
(C) $5 \log \left|\frac{x^5}{x^5+1}\right| + C$
(D) $\frac{1}{5} \log \left|\frac{x^5+1}{x^5}\right| + C$

14. $\int e^x \left(\frac{1}{x} - \frac{1}{x^2}\right) dx$ is:
(A) $\frac{e^x}{x} + C$
(B) $-\frac{e^x}{x} + C$
(C) $e^x \log x + C$
(D) $\frac{e^x}{x^2} + C$

15. $\int \frac{dx}{\sqrt{1-e^{2x}}}$ is solved by substituting e^x as:
(A) $\sin\theta$
(B) $\cos\theta$
(C) $\tan\theta$
(D) $\sec\theta$

16. $\int \frac{2x}{(x^2+1)(x^2+3)} dx$ is:
(A) $\frac{1}{2} \log \left|\frac{x^2+1}{x^2+3}\right| + C$
(B) $\log \left|\frac{x^2+1}{x^2+3}\right| + C$
(C) $\frac{1}{2} \log |(x^2+1)(x^2+3)| + C$
(D) $\tan^{-1} x + C$

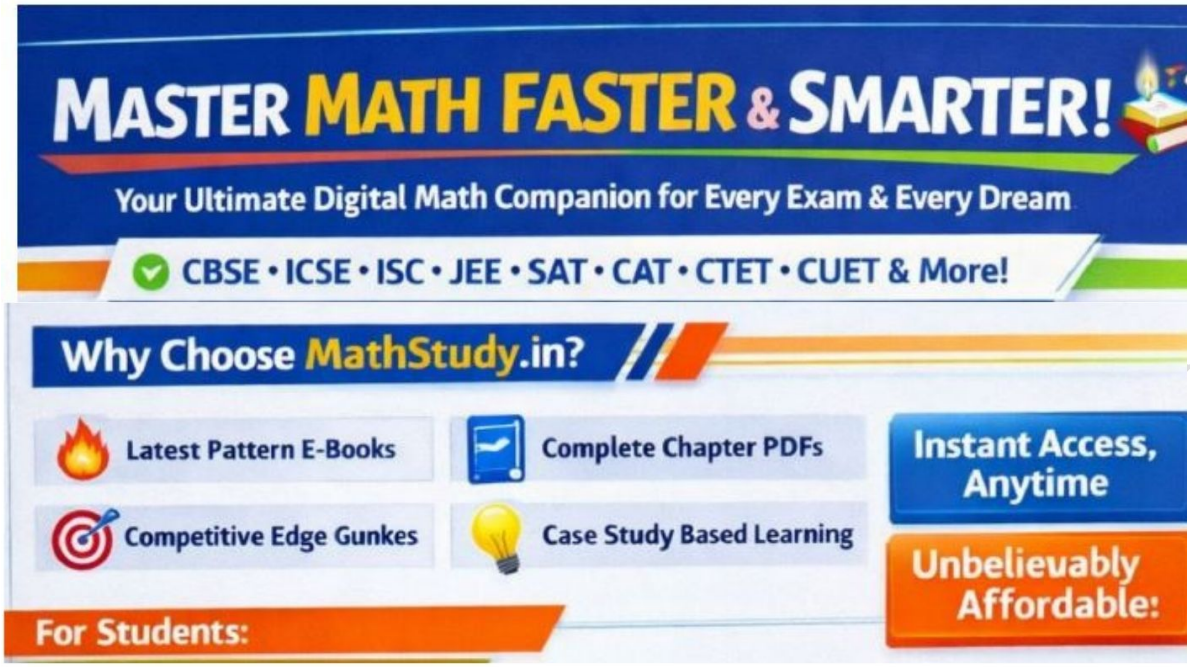
17. The value of $\int \frac{x^2}{(x^2+1)(x^2+4)} dx$ involves which technique?
(A) Integration by Parts
(B) Partial Fractions

(C) Substitution $x^2 = t$ (temporarily)
(D) Both (B) and (C)

18. $\int \sqrt{a^2 - x^2}dx$ at $x = a\sin\theta$ leads to:
(A) $\frac{x}{2}\sqrt{a^2 - x^2} + \frac{a^2}{2}\sin^{-1}\frac{x}{a} + C$
(B) $x\sqrt{a^2 - x^2} + C$
(C) $\frac{a^2}{2}\sin^{-1}\frac{x}{a} + C$
(D) $\frac{x}{2}\sqrt{a^2 - x^2} - \frac{a^2}{2}\sin^{-1}\frac{x}{a} + C$

19. $\int \frac{1}{1+\cos x}dx$ is equal to:
(A) $\tan(x/2) + C$
(B) $\cot(x/2) + C$
(C) $\frac{1}{2}\tan(x/2) + C$
(D) $2\tan(x/2) + C$

20. $\int \frac{dx}{\sqrt{x^2+16}}$ is:
(A) $\log|x + \sqrt{x^2 + 16}| + C$
(B) $\frac{1}{4}\tan^{-1}\frac{x}{4} + C$
(C) $\sin^{-1}\frac{x}{4} + C$
(D) $\frac{1}{4}\log|x + \sqrt{x^2 + 16}| + C$



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