Topic :
Integration

AVYASH
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MATHEMATICS
CLASS - XII

TIME- 120 MIN **MAXIMUM MARK- 50**

General Instructions :

1. This Question paper contains - five sections A, B, C and D. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 15 MCQ's of 1 mark each.
3. Section B has 3 Very Short Answer (VSA)-type questions of 2 marks each.
4. Section C has 3 Short Answer (SA)-type questions of 3 marks each.
5. Section D has 4 Long Answer (LA)-type questions of 5 marks each.

SECTION A
(Multiple Choice Questions)
Each question carries 1 mark

1. The value of the integral $\int \frac{dx}{1+\tan x}$ is

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

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

2. $\int x^2 e^{x^3} dx$ equals

(a) $\frac{1}{3}e^{x^3}+C$ (b) $\frac{1}{3}e^{x^4}+C$ (c) $\frac{1}{2}e^{x^3}+C$ (d) $\frac{1}{2}e^{x^2}+C$

3. $\int 2^{2^{2^x}}.2^{2^x}.2^x dx$ is equal to

(a) $\frac{1}{(\log_e 2)}.2^{2^{2^x}}+c$ (b) $\frac{1}{(\log_e 2)^2}.2^{2^{2^x}}+c$ (c) $\frac{2^{2^{2^x}}}{(\log_e 2)^3}+c$ (d) $\frac{1}{(\log_e 2)^3}.2^{2^x}+c$

4. $\int \frac{e^x(1+x)}{\cos^2(xe^x)}dx$ is equal to

(a) $\tan(xe^x)+c$ (b) $\cot(xe^x)+c$ (c) $\cot(e^x)+c$ (d) $\tan[e^x(1+x)]+c$

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5. $\int e^x\left(\frac{1}{x}-\frac{1}{x^2}\right)dx$ is equal to

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

6. $\int e^{5\log x}dx$ is equal to

(a) $\frac{x^5}{5}+C$ (b) $\frac{x^6}{6}+C$ (c) $5x^4+C$ (d) $6x^5+C$

7. $\int_0^{\pi/2}\frac{\sin^2 x dx}{\sin x+\cos x}$ is equal to

(a) $-\frac{1}{\sqrt{2}}\log\left(\sqrt{2}-1\right)$ (b) $\frac{1}{\sqrt{2}}\log\left(\sqrt{2}-1\right)$ (c) 0 (d) $\log\left(\sqrt{2}-1\right)$

8. $\int_0^7\frac{\sqrt[3]{x}}{\sqrt[3]{x}+\sqrt[3]{7-x}}dx$ is equal to

(A) 7 / 2 (B) 7 (C) 14 (D) 15 / 2

9. $\int_{\pi/6}^{\pi/3}\frac{dx}{1+\sqrt{\cot x}}dx$ is equal to

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{12}$ (C) $\frac{\pi}{36}$ (D) $\frac{\pi}{24}$

10. The value of $\int_0^8|x-5|dx$ is

(A) 15 / 2 (B) 9 (C) 7 (D) 9 / 2

11. $\int_0^{2/3}\frac{dx}{4+9x^2}$ is equal to

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{12}$ (C) $\frac{\pi}{24}$ (D) $\frac{\pi}{4}$

12. $\int_{-\pi/4}^{\pi/4}\frac{dx}{1+\cos 2x}$ is equal to

(a) 1 (b) 2 (c) 3 (d) 4

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13. $\int \frac{x^3}{x+1}$ is equal to

(a) $x+\frac{x^2}{2}+\frac{x^3}{3}-\log|1-x|+C$ (b) $x+\frac{x^2}{2}-\frac{x^3}{3}-\log|1-x|+C$

(c) $x-\frac{x^2}{2}-\frac{x^3}{3}-\log|1+x|+C$ (d) $x-\frac{x^2}{2}+\frac{x^3}{3}-\log|1+x|+C$

14. $\int \frac{\cos 2x-\cos 2\theta}{\cos x-\cos\theta}\,dx$ is equal to

(a) $2(\sin x+x\cos\theta)+C$ (b) $2(\sin x-x\cos\theta)+C$

(c) $2(\sin x+2x\cos\theta)+C$ (d) $2(\sin x-2x\cos\theta)+C$

15. $\int \frac{\sin x-x\cos x}{x(x+\sin x)}dx$ is equal to

(a) $\log\left|\frac{x}{x+\cos x}+\right|c$ (b) $\log\left|\frac{x}{x+\sin x}\right|+x+c$

(c) $x-\log\left|\frac{x}{x+\sin x}\right|+c$ (d) $\log\left|\frac{x}{x+\sin x}\right|+c$

SECTION B (Answer any THREE)

This section comprises of very short answer type-questions (VSA) of 2 marks each

16. Evaluate $\int \frac{2x}{\sqrt[3]{x^2+1}}dx$.

17. Evaluate $\int \frac{1}{e^x+1}dx$.

18. Evaluate $\int \sqrt{(x-3)(5-x)}dx$

19. Evaluate $\int \frac{dx}{1+\cos x}$

20. Evaluate $\int_0^{\pi/2} \frac{\sin x}{1+\cos^2 x}dx$

21. Evaluate $\int \frac{dx}{1+\tan x}$

SECTION C (Answer any THREE)

(This section comprises of short answer type questions (SA) of 3 marks each)

22. Prove that $\int_0^{\pi/4} \log(1+\tan x)dx=\frac{\pi}{8}\log 2$

23. Evaluate $\int \frac{(2x-3)}{(x^2-1)(2x+3)}dx$

24. Evaluate $\int_1^2 \frac{xdx}{(x+1)(x+2)}dx$

25. Evaluate $\int_1^2 \frac{5x^2}{x^2+2x+3}dx$

26. Evaluate $\int_0^1 \frac{dx}{e^x+e^{-x}}$

SECTION D (Answer any FOUR)
(This section comprises of long answer-type questions (LA) of 5 marks each)

27. Evaluate $\int \frac{xdx}{(x+1)^2(x+2)}dx$

28.Evaluate $\int_0^{\pi} \frac{xdx}{a^2\cos^2 x+b^2\sin^2 x}$

29. Evaluate $\int \frac{x+\sin x}{1+\cos x}\,dx$

30. If $\frac{x^3dx}{\sqrt{1+x^2}} = a\left(1+x^2\right)^{3/2} + b\sqrt{1+x^2} + C$, then find the value of a and b ?

31.Evaluate $\int e^{\tan^{-1}x}\left(\frac{1+x+x^2}{1+x^2}\right)dx$

32. Evaluate $\int \frac{dx}{\sin(x-a)\sin(x-b)}$

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