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MATHS

BOOKS - SURA MATHS (TAMIL ENGLISH)

INTEGRAL CALCULUS

Textual Question Exercise 11 1

1. Integrate the following with respect to x: x^{11}

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2. Integrate the following with respect to: $\frac{1}{x^7}$

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3. Integrate the following with respect to: $3\sqrt{x^4}$

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4. Integrate the following with respect to :

$$\left(x^5\right)^{\frac{1}{8}}$$

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5. $\dfrac{1}{\sin^2 x}$

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6. $\dfrac{\tan x}{\cos x}$

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7. $\frac{\cos x}{\sin^2 x}$

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8. $\frac{1}{\cos^2 x}$

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9. 12^3

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10. $\frac{x^{24}}{x^{25}}$

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11. integrate e^(x)`

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12. $\left(1+x^{2}\right)^{-1}$

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13. $\left(1-x^2\right)^{\frac{-1}{2}}$

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Exercise 11 2

1. Integrate the following functions with respect to x : $(x+5)^6$

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2. Integrate the following functions with respect to x : $\frac{1}{(2-3x)^4}$

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3. Integrate the following functions with respect to x : $\sqrt{3x+2}$

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4. $\sin 3x$

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5. $\cos(5 - 11x)$

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6. $\cos ec^2(5x - 7)$

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7. integrate e^(3x-6)`

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8. e^{8-7x}

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9. $\frac{1}{6-4x}$

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10. $\sec^2\left(\frac{x}{5}\right)$

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11. cosec (5 x+ 3) cot (5 x + 3)

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12. 30 sec (2 - 15 x) tan (2 - 15 x)

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13. $\frac{1}{\sqrt{1-(4x)^2}}$

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14. $\frac{1}{\sqrt{1-81x^2}}$

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15. $\frac{1}{1+36x^2}$

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Exercise 11 3

1. Integrate the following with respect to x :

$$(x+4)^5 + \frac{5}{(2-5x)^4} - \cos ec^2(3x-1)$$

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2. $4\cos(5-2x) + 9e^{3x-6} + \frac{24}{6-4x}$

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3.

$$\frac{\sec^2(x)}{5} + 18\cos 2x + 10\sec(5x+3)\tan(5x+3)$$

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4. $$\frac{8}{\sqrt{1-(4x)^2}}+\frac{27}{\sqrt{1-9x^2}}-\frac{15}{1+25x^2}$$

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5. $$\frac{6}{1+(3x+2)^2}-\frac{12}{\sqrt{1-(3-4x)^2}}$$

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6. $$\frac{1}{3}\cos\left(\frac{x}{3}-4\right)+\frac{7}{7x+9}+e^{\frac{x}{5}+3}$$

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Exercise 11 4

1. If $f'(x) = 4x - 5$ and $f(2) = 1$, find f(x).

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2. If $f'(x) = 9x^2 - 6x$ and $f(0) = -3$, find f(x)

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3. If $f''(x) = 12x - 6$ and $f(1) = 30$, $f'(1) = 5$ find $f(x)$

.

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4. A ball is thrown vertically upward from the ground with an initial velocity of 39.2 m/sec . If the only force considered is that attributed to the acceleration due to gravity find

how high the ball will rise ?

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5. A ball is thrown vertically upward from the ground with an initial velocity of 39.2 m/sec . If the only force considered is that attributed to the acceleration due to gravity, find

the speed with which will it strike the ground and

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6. A ball is thrown vertically upward from the ground with an initial velocity of 39.2 m/sec . If the only force considered is that attributed to the acceleration due to gravity find

how high the ball will rise ?

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7. A wound is healing in such a way that t days since Sunday the area of the wound has been decreasing at a rate of $-\frac{3}{(t+2)^2} cm^2$ per day.

If on Monday the area of the wound was $2cm^2$

What was the area of the wound on Sunday ?

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8. A wound is healing in such a way that t days since Sunday the area of the wound has been decreasing at a rate of $-\frac{3}{(t+2)^2}cm^2$ per day. If on Monday the area of the wound was $2cm^2$ What is the anticipated area of the wound on Thursday if it contimues to heal at the same rate ?

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Exercise 11 5

1. Integrate the following functions with respect to x :

$$\frac{x^3 + 4x^2 - 3x + 2}{x^2}$$

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2. $\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2$

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3. $(2x - 5)(36 + 4x)$

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4. $\cot^2 x + \tan^2 x$

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5. $\dfrac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha}$

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6. $\dfrac{\cos 2x}{\sin^2 x \cos^2 x}$

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7. $\dfrac{3 + 4\cos x}{\sin^2 x}$

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8. $\dfrac{\sin^2 x}{1 + \cos x}$

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9. $\frac{\sin 4x}{\sin x}$

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10. cos 3 x cos 2 x

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11. $\sin^2 5x$

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Watch Video Solution

12. $\frac{1+\cos 4x}{\cot x-\tan x}$

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13. $e^{x \log a} e^{x}$

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14. $(3x+4)\sqrt{3x+7}$

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15. $\frac{8^{1+x}+4^{1-x}}{2^x}$

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16. $\frac{1}{\sqrt{x+3}-\sqrt{x-4}}$

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17. $\frac{x+1}{(x+2)(x+3)}$

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Watch Video Solution

18. $\dfrac{1}{(x-1)(x+2)^2}$

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19. $\dfrac{3x-9}{(x-1)(x+2)(x^2+1)}$

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20. $\dfrac{x^3}{(x-1)(x-2)}$

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Exercise 11 6

1. Integrate the following with respect to x :

$$\frac{x}{\sqrt{1+x^2}}$$

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2. $\frac{x^2}{1+x^6}$

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3. $\frac{e^x - e^{-x}}{e^x + e^{-x}}$

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4. $\frac{10x^9 + 10^x \log, 10}{10^x + x^{10}}$

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5. $\frac{\sin \sqrt{x}}{\sqrt{x}}$

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6. $\dfrac{\cot x}{\log(\sin x)}$

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7. $\dfrac{\cos ecx}{\log\left(\tan\frac{x}{2}\right)}$

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8. $\dfrac{\sin 2x}{a^2 + b^2 \sin^2 x}$

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9. $\frac{\sin^{-1} x}{\sqrt{1-x^2}}$

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10. $\frac{\sqrt{x}}{1+\sqrt{x}}$

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11. $\frac{1}{x \log x \log(\log x)}$

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12. $\alpha\beta x^{\alpha-1}e^{-\beta x^{\alpha}}$

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13. $\tan x\sqrt{\sec x}$

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14. $x(1-x)^{17}$

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15. $\sin^5 x \cos^3 x$

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16. $\dfrac{\cos x}{\cos(x-a)}$

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Exercise 11 7

1. $9xe^{3x}$

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2. $x \sin 3x$

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3. $25xe^{-5x}$

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4. x sec x tan x

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5. x log x

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6. $27x^2e^{3x}$

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7. $\int x^2 \cos x dx$ is

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8. $x^3 \sin x$

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9. $\frac{x \sin^{-1} x}{\sqrt{1-x^2}}$

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10. $x^5 e^{x^2}$

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11. $\tan^{-1}\left(\frac{8x}{1-16x^2}\right)$

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12. $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$

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Exercise 11 8

1. Integrate the following with respect to x :

$e^{ax} \cos bx$

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2. Integrate the following with respect to x :

$e^{2x} \sin x$

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3. Integrate the following with respect to x :

$e^{-x} \cos 2x$

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4. $e^{-3x} \sin 2x$

Watch Video Solution

5. $e^{-4x} \sin 2x$

Watch Video Solution

6. $e^{-3x} \cos x$

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Exercise 11 9

1. Integrate the following with respect to x :

$e^{x}(\tan x + \log \sec x)$

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2. $e^x\left(\frac{x-1}{2x^2}\right)$

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3. $e^x \sec x(1+\tan x)$

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4. $e^x\left(\frac{2+\sin 2x}{1+\cos 2x}\right)$

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5. $e^{\tan^{-1} x}\left(\frac{1+x+x^2}{1+x^2}\right)$

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6. $\frac{\log x}{(1+\log x)^2}$

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Exercise 11 10

1. Find the integrals of the following :

$$\frac{1}{4 - x^2}$$

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2. Find the integrals of the following :

$$\frac{1}{25 - 4x^2}$$

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3. Find the integrals of the following :

$$\frac{1}{9x^2 - 4}$$

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4. $$\frac{1}{6x - 7 - x^2}$$

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5. $$\frac{1}{(x+1)^2 - 25}$$

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6. $\dfrac{1}{\sqrt{x^2+4x+2}}$

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7. $\dfrac{1}{\sqrt{(2+x)^2}-1}$

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8. $\dfrac{1}{\sqrt{x^2-4x+5}}$

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9. $\frac{1}{\sqrt{9+8x-x^2}}$

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Exercise 11 11

1. $\frac{2x-3}{x^2+4x-12}$

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2. $\dfrac{5x-2}{2+2x+x^2}$

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3. $\dfrac{3x+1}{2x^2-2x+3}$

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4. $\dfrac{2x+1}{\sqrt{9+4x-x^2}}$

Watch Video Solution

5. $\frac{x+2}{\sqrt{x^2-1}}$

Watch Video Solution

6. $\frac{2x+3}{\sqrt{x^2+4x+1}}$

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Exercise 11 12

1. Integrate the following functions with respect to x :

$$\sqrt{x^2 + 2x + 10}$$

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2. Integrate the following functions with respect to x :

$$\sqrt{x^2 - 2x - 3}$$

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3. Integrate the following functions with respect to x :

$$\sqrt{(6-x)(x-4)}$$

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4. $\sqrt{9-(2x+5)^2}$

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5. $\sqrt{81+(2x+1)^2}$

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6. $\sqrt{(x+1)^2-4}$

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Exercise 11 13

1. If $\int f(x)dx = g(x) + c, then \int f(x)g'(x)dx$

A. $\int (f(x))^2 dx$

B. $\int (x)g'(x)dx$

C. $\int f'(x)g(x)dx$

D. $\int (g(x))^2 dx$

Answer: B::D

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2. if $\int \frac{3^{\frac{1}{x}}}{x^2} dx = k\left(3^{\frac{1}{x}}\right) + c$, then the value of k is

A. log 3

B. $-\log 3$

C. $-\frac{1}{\log 3}$

D. $\frac{1}{\log 3}$

Answer: A::C

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3. If $\int f'(x)e^{x^2}dx = (x-1)e^{x^2} + c$, then f (x) is

A. $2x^3 - \frac{x^2}{2} + x + c$

B. $\frac{x^3}{2} + 3x^2 + 4x + c$

C. $x^3 + 4x^2 + 6x + c$

D. $\frac{2x^3}{3} - x^2 + x + c$

Answer: B::C

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4. The gradient (siope) of a curve at any point (x,y) is $\frac{x^2 - 4}{x^2}$. If the curve passes through the point (2 , 7) , then the equation of the curve is ,

A. $y = x + \frac{4}{x} + 3$

B. $y = x + \frac{4}{x} + 4$

C. $y = x^2 + 3x + 4$

D. $y = x^2 - 3x + 6$

Answer: C::D

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

A. $\cot(xe^x) + c$

B. $\sec(xe^x) + c$

C. $\tan(xe^x) + c$

D. $\cos(xe^x) + c$

Answer: A::C

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6. $\int \frac{\sqrt{\tan x}}{\sin 2x} dx$ is

A. $\sqrt{\tan x} + c$

B. $2\sqrt{\tan x} + c$

C. $\frac{1}{2}\sqrt{\tan x} + c$

D. $\frac{1}{4}\sqrt{\tan x} + c$

Answer: A::C

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7. $\int \sin^3 x dx$

A. $\frac{-3}{4}\cos x - \frac{\cos 3x}{12} + c(2)$

B. $\frac{3}{4}\cos x + \frac{\cos 3x}{12} + c$

C. $\frac{-3}{4}\cos x + \frac{\cos 3x}{12} + c$

D. $\frac{-3}{4}\sin x - \frac{\sin 3x}{12} + c$

Answer: A::B::C::D

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8. $\int \frac{e^{6\log x} - e^{5\log x}}{e^{4\log x} - e^{3\log x}} dx$

A. $x + c$

B. $\frac{x^3}{3} + c$

C. $\frac{3}{x^3} + c$

D. $\frac{1}{x^2} + c$

Answer: C

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9. $\int \frac{\sec x}{\sqrt{\cos 2x}} dx$ is

A. $\tan^{-1}(\sin x) + c$

B. $2\sin^{-1}(\tan x) + c$

C. $\tan^{-1}(\cos x) + c$

D. $\sin^{-1}(\tan x) + c$

Answer: A::C

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10. $\int \tan^{-1}\sqrt{\frac{1-\cos 2x}{1+\cos 2x}}dx$ is

A. $x^2 + c$

B. $2x^2 + c$

C. $\frac{x^2}{2} + c$

D. $-\frac{x^2}{2} + c$

Answer: B::C

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11. $\int 2^{3x+5} dx$ is

A. $\dfrac{3\left(2^{3x+5}\right)}{\log 2} + c$

B. $\dfrac{2^{3x+5}}{2\log(3x+5)} + c$

C. $\dfrac{2^{3x+5}}{2\log 3} + c$

D. $\dfrac{2^{3x+5}}{3\log(3x+5)} + c$

Answer: B::C

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12. $\int \frac{\sin^8 x - \cos^8 x}{1 - 2\sin^2 x \cos^2 x} dx$ is

A. $\frac{1}{2}\sin 2x + c$

B. $-\frac{1}{2}\sin 2x + c$

C. $\frac{1}{2}\cos 2x + c$

D. $-\frac{1}{2}\cos 2x + c$

Answer: A::B::C

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

A. $e^x\tan^{-1}(x+1)+c$

B. $\tan^{-1}(e^x)+c$

C. $e^x\frac{\left(\tan^{-1}x\right)^2}{2}+c$

D. $e^x\tan^{-1}x+c$

Answer: A::C

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14. $\int \frac{x^2 + \cos^2 x}{x^2 + 1} \cos ec^2 x dx$ is

A. $\cot x + \sin^{-1} x + c$

B. $-\cot x + \tan^{-1} x + c$

C. $-\tan x + \cot^{-1} x + c$

D. $-\cot x - \tan^{-1} x + c$

Answer: A::C

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15. $\int x^2 \cos x dx$ is

A. $x^2 \sin x + 2x \cos x - 2 \sin x + c$

B. $x^2 \sin x - 2x \cos x - 2 \sin x + c$

C. $-x^2 \sin x + 2x \cos x + 2 \sin x + c$

D. $-x^2 \sin x - 2x \cos x + 2 \sin x + c$

Answer: B::C

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16. $\int \sqrt{\frac{1-x}{1+x}} dx$ is

A. $\sqrt{1-x^2} + \sin^{-1} x + c$

B. $\sin^{-1} x - \sqrt{1-x^2} + c$

C. $\log\left|x + \sqrt{1-x^2}\right| - \sqrt{1-x^2} + c$

D. $\sqrt{1+x^2} + \log\left|x + \sqrt{1-x^2}\right| + c$

Answer: A::B::C

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17. $\int \frac{dx}{e^x - 1} dx$ is

A. $\log|e^x| - \log|e^x - 1| + c$

B. $\log|e^x| + \log|e^x - 1| + c$

C. $\log|e^x - 1| - \log|e^x| + c$

D. $\log|e^x + 1| - \log|e^x| + c$

Answer: c

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18. $\int e^{-4x} \cos x dx$ is

A. $\frac{e^{-4x}}{17}[4\cos x - \sin x] + c$

B. $\frac{e^{-4x}}{17}[-4\cos x + \sin x] + c$

C. $\frac{e^{-4x}}{17}[4\cos x + \sin x] + c$

D. $\frac{e^{-4x}}{17}[-4\cos x - \sin x] + c$

Answer: A

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19. $\int \frac{\sec^2 x}{\tan^2 x - 1} dx$ is

A. $2\log\left|\frac{1-\tan x}{1+\tan x}\right| + c$

B. $\log\left|\frac{1+\tan x}{1-\tan x}\right| + c$

C. $\log\left|\frac{1+\tan x}{1-\tan x}\right| + c$

D. $\frac{1}{2}\log\left|\frac{\tan x - 1}{\tan x + 1}\right| + c$ a

Answer: A::B::C

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20. $\int e^{-7x} \sin 5x dx$ is

A. $\frac{e^{-7x}}{74}[-7\sin 5x - 5\cos 5x] + c$

B. $\frac{e^{-7x}}{74}[7\sin 5x + 5\cos 5x] + c$

C. $\frac{e^{-7x}}{74}[7\sin 5x - 5\cos 5x] + c$

D. $\frac{e^{-7x}}{74}[-7\sin 5x + 5\cos 5x] + c$

Answer: C::D

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21. $\int x^2 e^{\frac{x}{2}} dx$ is

A. $x^2 e^{\frac{x}{2}} - 4xe^{\frac{x}{2}} - 8e^{\frac{x}{2}} + c$

B. $2x^2 e^{\frac{x}{2}} - 8xe^{\frac{x}{2}} - 16x^{\frac{x}{2}} + c$

C. $2x^2 e^{\frac{x}{2}} - 8xe^{\frac{x}{2}} + 16e^{\frac{x}{2}} + c$

D. $\frac{e^{\frac{x}{2}}}{2} - \frac{xe^{\frac{x}{2}}}{4} + \frac{e^{\frac{x}{2}}}{8} + c$

Answer: A::B::C

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22. $\int \frac{x+2}{\sqrt{x^2-1}} dx$ is

A. $\sqrt{x^2-1} - 2\log\left|x+\sqrt{x^2-1}\right| + c$

B. $\sin^{-1} x - 2\log\left|x+\sqrt{x^2-1}\right| + c$

C. $2\log\left|x+\sqrt{x^2-1}\right| + c$

D. $\sqrt{x^2-1} + 2\log\left|x+\sqrt{x^2-1}\right| + c$

Answer: A::B::C

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23. $\int \frac{1}{x\sqrt{(\log x)^2 - 5}} dx$ is

A. $\log\left|x + \sqrt{x^2 - 5}\right| + c$

B. $\log\left|\log x + \sqrt{\log x - 5}\right| + c$

C. $\log\left|\log x - \sqrt{(\log x)^2 - 5}\right| + c$

D. $\log\left|\log x + \sqrt{(\log x)^2 - 5}\right| + c$

Answer: B::C

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24. $\int \sin \sqrt{x} dx$ is

A. $2\left(-\sqrt{x}\cos\sqrt{x}+\sin\sqrt{x}\right)+c$

B. $2\left(-\sqrt{x}\cos\sqrt{x}-\sin\sqrt{x}\right)+c$

C. $2\left(-\sqrt{x}\sin\sqrt{x}-\cos\sqrt{x}\right)+c$

D. $2\left(-\sqrt{x}\sin\sqrt{x}+\cos\sqrt{x}\right)+c$

Answer: B::C

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25. $\int e^{\sqrt{x}} dx$ is

A. $2\sqrt{x}\left(1 - e^{\sqrt{x}}\right) + c$

B. $2\sqrt{x}\left(e^{\sqrt{x}} - 1\right) + c$

C. $2e^{\sqrt{x}}\left(1 - \sqrt{x}\right) + c$

D. $2e^{\sqrt{x}}\left(\sqrt{x} - 1\right) + c$

Answer: A::B::C

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Additional Problems Section A 1 Mark

1. $\int \frac{1}{2} \sec^2 x$ dx is _____ +c .

A. $\frac{1}{2} \tan x$

B. $\tan x$

C. $2 \tan x$

D. none of these

Answer: A::B

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2. $\int 3^{x+2} dx =$ _____ + c

A. $\dfrac{3^x}{\log 3}$

B. $9\left(\dfrac{3^x}{\log 3}\right)$

C. $\dfrac{3^x}{9\log 3}$

D. $3^x \cdot 9$

Answer: C

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3. $\int \frac{(\log x)^3}{x} dx =$ _____ + c

A. $\frac{(\log x)^4}{4}$

B. $3(\log x)^2$

C. $(\log x)^4$

D. $\frac{1}{3\log x}$

Answer: D

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4. $\int \frac{4\left(\sin^{-1} x\right)^3}{\sqrt{1-x^2}} dx =$ _____ + c

A. $\log\left(\sin^{-1} x\right)$

B. $\left(\sin^{-1} x\right)^4$

C. $4\left(\sin^{-1} x\right)^4$

D. $\frac{\left(\sin^{-1} x\right)^4}{4}$

Answer: A::D

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5. $\int \frac{e^x}{(1+e^x)^2} dx =$ _____ + c

A. $\frac{1}{1+e^x}$

B. $-\frac{1}{1+e^x}$

C. $1+e^x$

D. $\frac{(1+e^x)^3}{3}$

Answer: A

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6. $\frac{\sin\sqrt{x}}{\sqrt{x}}$

A. $2\cos\sqrt{x}$

B. $2\sin\sqrt{x}$

C. $-2\sin\sqrt{x}$

D. $-2\cos\sqrt{x}$

Answer: B::C

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7. Match List - I with List II .

	List I		List II
$i.$	$\int_0^{\frac{x}{2}} \log(\tan x)dx$	(a)	$\frac{16}{35}$
$ii.$	$\int_0^1 x(1-x)^{10}dx$	(b)	$\frac{120}{4096}$
$iii.$	$\int_0^{\frac{\pi}{2}} \sin^7 x dx$	(c)	$\frac{1}{132}$
$iv.$	$\int_0^{\infty} x^5 e^{-4x} dx$	(d)	0

A.

(i)	(ii)	(iii)	(iv)
d	c	a	b

B.

(i)	(ii)	(iii)	(iv)
d	c	b	a

C.

(i)	(ii)	(iii)	(iv)
d	d	a	b

D.

(i)	(ii)	(iii)	(iv)
b	c	a	d

Answer: A::B::C::D

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Section B 2 Marks

1. Evaluate $\int \frac{\cos 2x + 2\sin^2 x dx}{\cos^2 x}$

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2. Evaluate $\int 2^x e^x dx$

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3. Evaluate $\int \sqrt{x} - \frac{\cos^2(x)}{2} dx$

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4. Evaluate $\int x^2 \log x dx$

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Section C 3 Marks

1. Evaluate $\int \frac{x^4 + x^2 + 1}{x^2 - x + 1} dx$

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2. Evaluate $\int \frac{\sin x}{\sqrt{3+2\cos x}} dx$

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3. Evaluate $\int \cot^3 x dx$

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4. Evaluate $\int \frac{e^{-x}}{16+9e^{-2x}} dx$

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Section D 5 Marks

1. Evaluate $\int \frac{dx}{\tan x + \cot x + \sec x + \cos ecx}$

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2. Evaluate 1 $\int \frac{x^7}{x+1} dx$

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3. Evaluate $\int \frac{1}{x^{\frac{1}{2}} + x^{\frac{1}{3}}} dx$

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