CHEMISTRY ONLINE
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PURE MATH

ALGEBRA AND FUNCTION

Level & Board	EDEXCEL (A-LEVEL)
TOPIC:	INTEGRATION
PAPER TYPE:	SOLUTION - 11
TOTAL QUESTIONS	8
TOTAL MARKS	26

INTEGRATION - 11

1. $sin61^0$

Let $y = \sin x$

We take $x = 60^0$

$\delta x = dx = 61^0 - 60^0 = 1^0 = 0.01745$

$y = \sin 60^0 = 0.866$

Now $y = \sin x$

$d(y) = d(\sin x)$

$dy = \cos x \ dx$

$dy = cos60^0(0.01745)$

$dy = 0.0087$

Thus $\sin 61^0 \approx y + dy$

$= 0.866 + 0.0087$

$= 0.8747$

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

$= \int \frac{2-1-x^2}{1+x^2} dx$

$= \int \frac{2-(1+x^2)}{1+x^2} dx$

$= \int \frac{2}{1+x^2} dx - \int \frac{1+x^2}{1+x^2} dx$

$= 2\int \frac{1}{1+x^2} dx - \int 1 dx$

$= 2\tan^{-1} x - x + c$

3. $\int \sin(a+b)x dx$

$= \frac{-\cos(a+b)x}{a+b} dx$

$= -\frac{1}{a+b}\cos(a+b)x + c$

4. $= \int \ln x \times \frac{1}{x} dx$

As $f(x) = \ln x$

And $f'(x) = \frac{1}{x}$, so

Using $\int [f(x)]^n = \frac{[f(x)]^{n+1}}{n+1}$

$= \frac{(\ln x)^{1+1}}{1+1} + c$

$= \frac{(\ln x)^2}{2} + c$

5. $= \int (2x+3)^{1/2} dx$

× and ÷ by 2 to make derivative

$= \frac{1}{2}\int (2x+3)^{1/2}.2dx$

$= \frac{1}{2}.\frac{(2x+3)^{1/2+1}}{1/2+1} + c$

$$= \frac{1}{2}.\frac{(2x+3)^{3/2}}{3/2} + c$$

$$= \frac{1}{2}.\frac{2}{3}(2x+3)^{3/2} + c$$

$$= \frac{1}{3}(2x+3)^{3/2} + c$$

6.

$$= \int \tan^2 x dx$$

$$= \int (\sec^2 x - 1) dx$$

$$= \int (\sec^2 x dx - \int 1 dx$$

$$= \tan x - x + c$$

7.

$$= \int \frac{1}{(2x+3)^4} dx$$

$$= \int (2x+3)^{-4} dx$$

$$= \frac{1}{2}.\frac{(2x+3)^{-4+1}}{-4+1} + c$$

$$= -\frac{1}{6(2x+3)^3} + c$$

8. We know that

$$\frac{d}{dx}[lnf(x)] = \frac{1}{f(x)}.f'(x)$$

Taking integration on both sides

$$\int \frac{d}{dx}[lnf(x)] = \int \frac{1}{f(x)}.f'(x)$$

$$\Longrightarrow \quad lnf(x) = \int \frac{f'(x)}{f(x)} dx$$

$$\Longrightarrow \quad \int \frac{f'(x)}{f(x)} dx = lnf(x) + c \quad \text{By definition}$$

$$(\int f(x)\,dx = F(x) + c$$

Hence proved.

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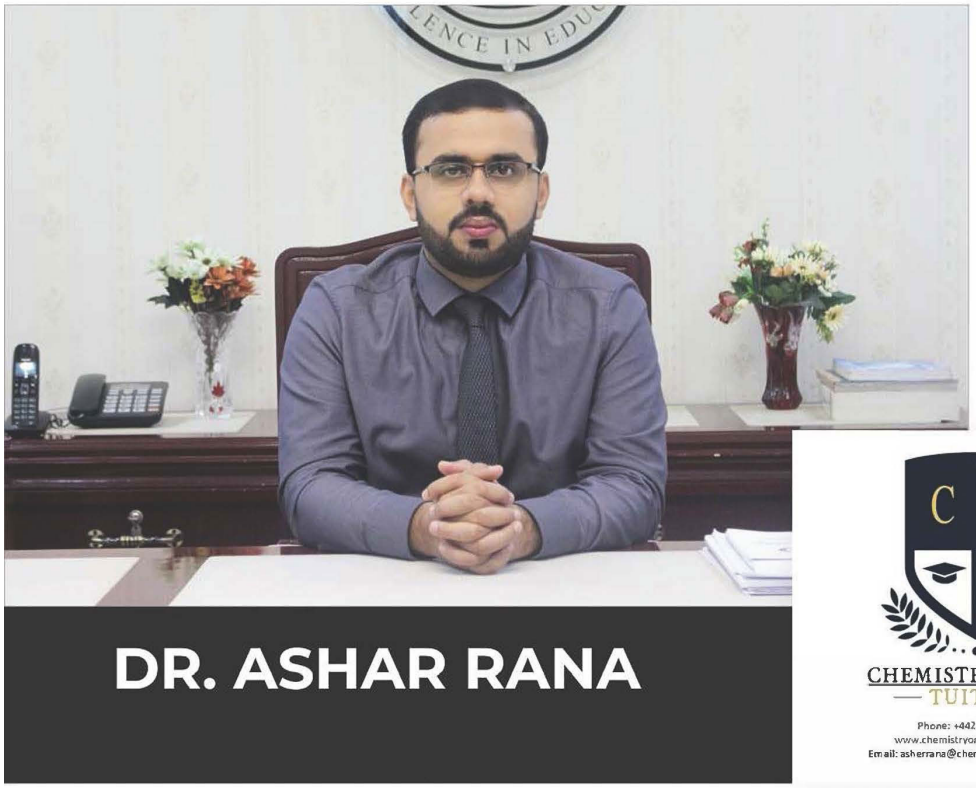

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