

Questions

For CRT - 12

BY O.P. GUPTA

INDIRA AWARD WINNER

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Max. Marks : 40

Time : 60 Minutes

Topics : Indefinite Integrals (Type A to Type G)

■ Advanced MATH Classes, 1st Floor (Above Burger Shop), Opp. HP Petrol Pump, Thana Road, Najafgarh.

Q01. Evaluate : (a) $\int \frac{x^{1/2}}{1+x^{3/4}} dx$ (b) $\int \frac{\operatorname{cosec} x}{\operatorname{cosec} x - \cot x} dx$. [2 × 2 = 4]

Evaluate the following integrals (Q02 - Q07) :

Q02. $\int \frac{dx}{\sin^2 x - \sin 2x}$

Q03. $\int \frac{x^2 + x + 1}{(x-1)^3} dx$

Q04. $\int x^2 e^{2x} dx$

Q05. $\int x \sin^{-1} x dx$

Q06. $\int e^x \frac{(1-x)^2}{(1+x^2)^2} dx$

Q07. $\int \frac{(x^2+7)(x^2+5)}{(x^2+3)(x^2+1)} dx$. [4 × 6 = 24]

Q08. Evaluate : $\int [\sqrt{\tan x} - \sqrt{\cot x}] dx$.

Q09. Find : $\int \sqrt{1+x^4} \frac{\{\log(1+x^4) - 4 \log x\}}{x^7} dx$ OR Find : $\int \frac{\cos^{-1} x - \sin^{-1} x}{\cos^{-1} x + \sin^{-1} x} dx$. [6 × 2 = 12]

INDIRA Award Winner O.P. Gupta is author of several popular books on Mathematics for Classes 12th & 11th. These can be bought at webstore www.iMathematica.com.

Test held on : 25 June, 2017

Solutions Of CRT-12

Q01. (a) Let $I = \int \frac{x^{1/2}}{1+x^{3/4}} dx$ $\Rightarrow I = \int \frac{x^{3/4}}{x^{1/4}(1+x^{3/4})} dx$
 $\left[\begin{array}{l} \text{Put } 1+x^{3/4} = t \\ \Rightarrow \frac{dx}{x^{1/4}} = \frac{4}{3} dt \end{array} \right.$

$\therefore I = \frac{4}{3} \int \frac{t-1}{t} dt$ $\Rightarrow I = \frac{4}{3} \int \left(1 - \frac{1}{t}\right) dt$ $\Rightarrow I = \frac{4}{3} (t - \log|t|) + C$

$\Rightarrow I = \frac{4}{3} (1+x^{3/4} - \log|1+x^{3/4}|) + C$ or, $I = \frac{4}{3} (x^{3/4} - \log|1+x^{3/4}|) + \lambda$, where $C + \frac{4}{3} = \lambda$

(b) $-\cot \frac{x}{2} + C$ or $-\cot x - \operatorname{cosec} x + C$.

Q02. $\frac{1}{2} \log \left| \frac{\tan x - 2}{\tan x} \right| + C$ or, $\frac{1}{2} \log |1 - 2 \cot x| + C$

Q03. $\log|x-1| - \frac{3}{x-1} - \frac{3}{2(x-1)^2} + C$

Q04. $\frac{e^{2x}}{4} [2x^2 - 2x + 1] + C$

Q05. $\frac{x^2}{2} \sin^{-1} x + \frac{x}{4} \sqrt{1-x^2} + C$

Q06. $\frac{e^x}{1+x^2} + C$

Q07. $x - \frac{4}{\sqrt{3}} \tan^{-1} \left(\frac{x}{\sqrt{3}} \right) + 12 \tan^{-1} x + C$.

Q08. See **Mathematicia by O.P. Gupta (Type G)**.

Q09. $\frac{[x^4 + 1]^{3/2}}{9x^6} - \frac{[x^4 + 1]^{3/2}}{6x^6} \log \left(\frac{x^4 + 1}{x^4} \right) + C$ **OR** See **Mathematicia by O.P. Gupta (Type G)**.

❖ Dear Student/Teacher,

I would urge you for a little favour. Please notify me about any error (s) which you notice in this (or other Maths) work. It would be beneficial for all the future learners of Maths like us. Any constructive criticism will be well acknowledged.

Please find below my contact info. when you decide to offer me your valuable suggestions.

I'm looking forward for a response.

Apart from this, I would wish **if you inform your friend/students** about my efforts for Maths so that they may also be benefitted.

Let's learn Maths with smile :-)

☞ For any clarification(s), please contact :

O.P. Gupta, Math Mentor

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