

**Topics :** Indefinite Integration, Sequence & Series

**Type of Questions**

**M.M., Min.**

**Single choice Objective (no negative marking) Q.1, 2**

**(3 marks, 3 min.)**

**[6, 6]**

**Subjective Questions (no negative marking) Q.3,4,5,6,7**

**(4 marks, 5 min.)**

**[20, 25]**

**Match the Following (no negative marking) Q.8**

**(8 marks, 8 min.)**

**[8, 8]**

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

- (A)  $\ln \left| \frac{xe^x}{1+xe^x} \right| + C$  (B)  $\ln \left| \frac{xe^x}{1+xe^x} \right| + \frac{1}{1+xe^x} + C$  (C)  $\frac{1}{1+xe^x} + C$  (D) None of these

2.  $\int \frac{dx}{\tan x + \cot x + \sec x + \operatorname{cosec} x}$  is equal to

- (A)  $\frac{1}{2} (\sin x + \cos x + x) + c$  (B)  $\frac{1}{2} (\sin x - \cos x - x) + c$   
(C)  $\frac{1}{2} (\cos x - x + \sin x) + c$  (D) None of these

3. If a and b are the arithmetic means of  $a_1, a_2, \dots, a_n$  and  $b_1, b_2, \dots, b_n$  respectively, and

$a_i + b_i = 1$  ( $i = 1, 2, \dots, n$ ), show that  $\sum_{i=1}^n a_i b_i = nab - \sum_{i=1}^n (a_i - a)^2$ .

4. Evaluate : (i)  $\int \frac{dx}{\sin^6 x}$  (ii)  $\int \frac{\cos x + \sin x}{\sqrt{\sin 2x}} dx$

5. Evaluate :  $\int \frac{(x \cos x + 1)}{\sqrt{2x^3 e^{\sin x} + x^2}} dx$

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

7. Evaluate :  $\int \frac{1-x^7}{x(1+x^7)} dx$

8. Column - I

(A)  $\int \frac{x^4-1}{x^2\sqrt{x^4+x^2+1}} dx$

(B)  $\int \frac{x^2-1}{x\sqrt{1+x^4}} dx$

(C)  $\int \frac{1+x^2}{(1-x^2)\sqrt{1+x^4}} dx$

(D)  $\int \frac{1}{(1+x^4)\sqrt{\sqrt{1+x^4}-x^2}} dx$

Column - II

(p)  $\ln \left( \frac{(x^2+1)+\sqrt{x^4+1}}{x} \right) + C$

(q)  $-\frac{1}{\sqrt{2}} \ln \left( \frac{\sqrt{x^4+1}-\sqrt{2}x}{(x^2-1)} \right) + C$

(r)  $-\tan^{-1} \left( \sqrt{\sqrt{1+\frac{1}{x^4}}-1} \right) + C$

(s)  $\frac{\sqrt{x^4+x^2+1}}{x} + C$

## Answers Key

1. (B)      2. (B)

4. (i)  $c - \cot x - \frac{2}{3} \cot^3 x - \frac{1}{5} \cot^5 x$

(ii)  $\sin^{-1} (\sin x - \cos x) + c$

5.  $\ln \left\{ \frac{\sqrt{2xe^{\sin x} + 1} - 1}{\sqrt{2xe^{\sin x} + 1} + 1} \right\} + c$

6.  $\frac{1}{\sqrt{3}} \tan^{-1} \left( \frac{2x^2+1}{\sqrt{3}} \right) + c$

7.  $\ln x - (2/7) \ln (1+x^7) + c$

8. (A)  $\rightarrow$  s ; (B)  $\rightarrow$  p ; (C)  $\rightarrow$  q ; (D)  $\rightarrow$  r