

Topics : Indefinite Integration, Determinant, Vector

Type of Questions

M.M., Min.

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

(3 marks, 3 min.)

[6, 6]

Multiple choice objective (no negative marking) Q.3, 4

(5 marks, 4 min.)

[10, 8]

Subjective Questions (no negative marking) Q.5,6,7,8

(4 marks, 5 min.)

[16, 20]

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

- (A) $\frac{1}{2}\sqrt{1+x} + C$ (B) $\frac{2}{3}(1+x)^{3/2} + C$ (C) $\sqrt{1+x} + C$ (D) $2(1+x)^{3/2} + C$

2. Let m be a positive integer & $D_r = \begin{vmatrix} 2r-1 & {}^m C_r & 1 \\ m^2-1 & 2^m & m+1 \\ \sin^2(m^2) & \sin^2(m) & \sin^2(m+1) \end{vmatrix}$ ($0 \leq r \leq m$), then the value of $\sum_{r=0}^m D_r$

is given by :

- (A) 0 (B) $m^2 - 1$ (C) 2^m (D) $2^m \sin^2(2^m)$

3. $\int \frac{\sin x \cos x}{\sqrt{1-\sin^4 x}} dx$ is equal to

- (A) $\frac{1}{2} \sin^{-1}(\sin^2 x) + C$ (B) $-\frac{1}{2} \cos^{-1}(\sin^2 x) + C$ (C) $\tan^{-1}(\sin^2 x) + C$ (D) $\cot^{-1}(\sin x) + C$

4. The vector $\hat{i} + x\hat{j} + 3\hat{k}$ is rotated through an angle θ and doubled in magnitude, then it becomes $4\hat{i} + (4x-2)\hat{j} + 2\hat{k}$. Then values of x are

- (A) $-\frac{2}{3}$ (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) 2

5. Evaluate the following

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

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

6. Evaluate the following

(i) $\int e^{2x} \left(\frac{1+\sin 2x}{1+\cos 2x} \right) dx$

(ii) $\int \frac{x \sin^{-1} x}{(1-x^2)^{3/2}} dx$

7. Evaluate the following

(i) $\int \frac{e^x}{x+2} [(1+(x+2)\ln(x+2))] dx$

(ii) $\int \frac{x^5}{x^2+1} dx$

8. Evaluate the following

(i) $\int \frac{dx}{\sqrt{x}(x+9)}$

(ii) $\int e^x (1 - \cot x + \cot^2 x) dx$

Answers Key

1. (B) 2. (A) 3. (A)(B) 4. (A)(D)

5. (i) $\tan(x e^x) + c$

$$(ii) \frac{1}{\sqrt{2}} \log \left| \left(x + \frac{3}{4} \right) + \sqrt{x^2 + \frac{3}{2}x - 1} \right| + C$$

$$6. (i) \frac{e^{2x}}{2} \tan x + c \quad (ii) \frac{\sin^{-1} x}{\sqrt{1-x^2}} - \frac{1}{2} \log \left| \frac{1+x}{1-x} \right| + c$$

$$7. (i) e^x \ln(x+2) + c \quad (ii) \frac{x^4}{4} - \frac{x^2}{2} + \frac{1}{2} \ln(x^2+1) + c$$

$$8. (i) \frac{2}{3} \tan^{-1} \sqrt{x} + c \quad (ii) -e^x \cot x + c$$