

Topic : Definite Integration

Type of Questions

M.M., Min.

Single choice Objective (no negative marking) Q.1,2,3,4,5,6 (3 marks, 3 min.) [18, 18]

Multiple choice objective (no negative marking) Q.7 (5 marks, 4 min.) [5, 4]

Fill in the Blanks (no negative marking) Q.8 (4 marks, 4 min.) [4, 4]

Subjective Questions (no negative marking) Q.9,10 (4 marks, 5 min.) [8, 10]

1. The degree of the differential equation, $e^{(d^3y/dx^3)^2} + x \frac{d^2y}{dx^2} + y = 0$ is:

- (A) 1 (B) 2 (C) 0 (D) not defined

2. If $\int_0^1 \tan^{-1} x \, dx = \alpha$, then $\int_0^{\pi/4} \tan^{-1} \left(\frac{2 \cos^2 \theta}{2 - \sin 2\theta} \right) \sec^2 \theta \, d\theta$ is equal to

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

3. The line $y = mx$ bisects the area enclosed by the curve $y = 1 + 4x - x^2$ and the lines $x = 0$, $x = \frac{3}{2}$ and $y = 0$. Then the value of m is

- (A) $\frac{13}{6}$ (B) $\frac{6}{13}$ (C) $\frac{3}{2}$ (D) 4

4. The area of the closed figure bounded by $y = x$, $y = -x$ and the tangent to the curve $y = \sqrt{x^2 - 5}$ at the point (3, 2) is:

- (A) 5 (B) $\frac{15}{2}$ (C) 10 (D) $\frac{35}{2}$

5. The area $\{(x, y); x^2 \leq y \leq \sqrt{x}\}$ is equal to

- (A) $\frac{1}{3}$ (B) $\frac{2}{3}$ (C) $\frac{1}{6}$ (D) none of these

6. The solution of the differential equation, $x(x^2 + 3y^2)dx + y(y^2 + 3x^2)dy = 0$ is

(A) $x^4 + y^4 + x^2y^2 = c$

(B) $x^4 + y^4 + 3x^2y^2 = c$

(C) $x^4 + y^4 + 6x^2y^2 = c$

(D) $x^4 + y^4 + 9x^2y^2 = c$

7. Identify the statement(s) which is/are True.

(A) $f(x, y) = e^{y/x} + \tan \frac{y}{x}$ is homogeneous of degree zero

(B) $x \cdot \ln \frac{y}{x} dx + \frac{y^2}{x} \sin^{-1} \frac{y}{x} dy = 0$ is homogeneous of degree one

(C) $f(x, y) = x^2 + \sin x \cdot \cos y$ is not homogeneous

(D) $(x^2 + y^2) dx - (xy^2 - y^3) dy = 0$ is a homogeneous differential equation.

8. The order and degree of the differential equation $\sqrt{\frac{dy}{dx}} - 4 \frac{dy}{dx} - 7x = 0$ are _____ and _____ respectively.

9. Evaluate : $\int_{-(\pi/4)^{1/3}}^{(\pi/4)^{1/3}} \frac{x^2}{(1 + \sin^2 x^3)(1 + e^{x^7})} dx$

10. Find the order and degree of the following differential equations

(i) $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 = 0$

(ii) $(x^2 + y^2) dx - 2xy dy = 0$

(ii) $\sqrt{1 + \left(\frac{dy}{dx}\right)^2} = x^3$

(iv) $\sqrt{\frac{d^3y}{dx^3}} = \sqrt[4]{\left(\frac{dy}{dx} + 5\right)}$

Answers Key

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

5. (A) 6. (C) 7. (A)(B)(C)

8. 1, 2 9. $\frac{1}{3\sqrt{2}}\tan^{-1}\sqrt{2}$

10. (i) 2, 1 (ii) 1, 1 (iii) 1, 2 (iv) 3, 2