



RK VISION ACADEMY

NEET | IIT – JEE | FOUNDATIONS

MATRIC PRACTICE PAPER (2024)

(Mathematics)

Grade: XII

Chapter: Applications Of Integration

Marks: 40 marks

Time: 90 minutes

SECTION A

(10x1=10)

Choose the correct option.

- The value of $\int_0^{\frac{2}{3}} \frac{dx}{\sqrt{4-9x^2}}$ is
 (a) π (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$
- The area between $y^2=4x$ and its latus rectum is
 (a) $\frac{8}{3}$ (b) $\frac{2}{3}$ (c) $\frac{4}{3}$ (d) $\frac{5}{3}$
- The value of $\int_0^{\frac{\pi}{3}} \tan x \, dx$ is
 (a) $-\log 2$ (b) $\log 2$ (c) $-\log 3$ (d) $\log 3$
- The value of $\int_0^1 x(1-x)^{99} dx$ is
 (a) $\frac{1}{10010}$ (b) $\frac{1}{11000}$ (c) $\frac{1}{10001}$ (d) $\frac{1}{10100}$
- The value of $\int_0^{\pi} \sin^4 x \, dx$ is
 (a) $\frac{4}{27}$ (b) $\frac{7}{27}$ (c) $\frac{2}{27}$ (d) $\frac{5}{27}$
- For any value of $n \in \mathbb{Z}$, $\int_0^{\pi} e^{\cos^2 x} \cos^3 [(2n+1)x] dx$ is
 (a) $\frac{\pi}{2}$ (b) π (c) 0 (d) 2
- The value of $f(x) = \int_0^x t \cos t \, dt$, then $\frac{df}{dx} =$
 (a) $\cos x - x \sin x$ (b) $\sin x + x \cos x$ (c) $x \cos x$ (d) $x \sin x$
- If $\frac{\Gamma(n+2)}{\Gamma(n)} = 90$, then n is
 (a) 10 (b) 5 (c) 8 (d) 9

9. If $f(x) = \int_1^x \frac{e^{\sin u}}{u} du$, $x > 1$, and $\int_1^3 \frac{e^{\sin x^2}}{x} dx = \frac{1}{2}[f(a) - f(1)]$, then one of the possible value of a is
(a) 3 (b) 6 (c) 9 (d) 5

10. If $\int_0^x f(t) dt = x + \int_x^1 t f(t) dt$, then the value of $f(1)$ is
(a) $\frac{1}{2}$ (b) 2 (c) 1 (d) $\frac{3}{4}$

SECTION B

(3x2=6)

Answer the following.

11. Evaluate: $\int_b^\infty \frac{1}{a^2+x^2} dx$, $a > 0$, $b \in \mathbb{R}$.
12. Evaluate: $\int_0^\infty x^5 e^{-3x} dx$.
13. Find, by integration, the volume of the solid generated by revolving about y-axis the region bounded by the curves $y = \log x$, $y = 0$, $x = 0$ and $y = 2$.

SECTION C

(3x3=9)

Answer the following.

14. Show that $\int_0^{\frac{\pi}{3}} \frac{\sec x \tan x}{1 + \sec^2 x} dx = \tan^{-1}(2) - \frac{\pi}{4}$.
15. Father of a family wishes to divide his square field bounded by $x = 0$, $x = 4$, $y = 4$ and $y = 0$ along the curve $y^2 = 4x$ and $x^2 = 4y$ into three equal parts for his wife, daughter and son. Is it possible to divide? If so, find the area to be divided among them.
16. Evaluate: $\int_0^{2a} x^2 \sqrt{2ax - x^2} dx$.

SECTION D

(3x5=15)

Answer the following.

17. Show that $\int_0^a \frac{f(x)}{f(x) + f(a-x)} dx = \frac{a}{2}$.
18. Find the area of the region bounded by $3x - 2y + 6 = 0$; $x = -3$; $x = 1$ and x-axis.
19. Using integration find the area of the region bounded by triangle ABC, whose vertices A, B and C are $(-1, 1)$, $(3, 2)$ and $(0, 5)$ respectively.

