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**DHANALAKSHMI SRINIVASAN COLLEGE
OF ARTS & SCIENCE FOR WOMEN
(AUTONOMOUS)**

(For Candidates admitted from 2020 - 2021 onwards)



UG DEGREE EXAMINATIONS APRIL - 2021

B.Sc., - MATHEMATICS

INTEGRAL CALCULUS

Time: 3 Hrs

Max.Marks: 75

PART - A

CHOOSE THE CORRECT ANSWER

(10X1=10)

1. $\int \frac{dx}{1+x^2} = ?$

a) $\tan x$

b) $\tan^{-1}x$

c) $\cot x$

d) $\sec^{-1} x$

2. $\int \frac{dx}{\sqrt{a^2+x^2}} = ?$

a) $\sin^{-1}\frac{x}{a}$

b) $\cos^{-1}\frac{x}{a}$

c) $\sinh^{-1}\frac{x}{a}$

d) $\cosh^{-1}\frac{x}{a}$

3. The value of $\int x^2 dx = ?$

a) $\frac{3}{7}$

b) $\frac{7}{3}$

c) $\frac{7}{3}$

d) $\frac{3}{7}$

4. $\int_0^{\pi/2} \cos^8 x dx = ?$

a) $\frac{105\pi}{768}$

b) $\frac{48}{105}$

c) $\frac{8}{693}$

d) $\frac{1}{120}$

5. The area bounded by one arch of the curve $\sin ax$ and the X-axis is

a) $\frac{a}{2}$

b) $\frac{2}{a}$

c) $\frac{-2}{a}$

d) $\frac{-a}{2}$

6. The area of the ellipse $x^2 + 4y^2 - 6x + 8y + 9 = 0$

a) $\frac{\pi}{2}$

b) 2π

c) -2π

d) $-\frac{\pi}{2}$

7. The value of $\int_0^1 \int_0^{x^2} (x^2 + y^2) dy dx$ is

a) $\frac{105}{26}$

b) $\frac{26}{105}$

c) $\frac{21}{5}$

d) $\frac{5}{21}$

8. The value of $\iiint_R (x - y + z) dx dy dz$ where R is given by $1 \leq z \leq 2$, $2 \leq x \leq 3$ is

a) 0

b) 1

c) 2

d) 4

9. $\beta(m, n) = ?$

a) $\frac{\Gamma(m) \Gamma(n)}{\Gamma(m+n)}$

b) $\frac{\Gamma(n-m)}{\Gamma(m+n)}$

c) $\frac{\Gamma(m+n)}{\Gamma(m) \Gamma(n)}$

d) $\frac{\Gamma(n-m)}{\Gamma(m) \Gamma(n)}$

10. $\int \sqrt{n+1} = ?$

a) $\int_0^\infty x^n e^{-x} dx$

b) $\int_0^\infty x^{-n} e^x dx$

c) $\int_0^\infty x^{n-1} e^{-x} dx$

d) $\int_0^\infty x^{n+1} e^x dx$

PART - B

ANSWER ALL THE QUESTIONS

(5X7=35)

11. a) Evaluate $\int \frac{2x+3}{x^2+x+1} dx$

(OR)

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

12. a) Prove that $\int_0^\pi \theta \sin^3 \theta d\theta = \frac{2\pi}{3}$

(OR)

b) Evaluate $\int x \sin^{-1} x dx$

13. a) Find the area bounded by one arch of the cycloid $x = a(\theta - \sin\theta)$; $y = a(1 - \cos\theta)$ and its base

(OR)

b) Find the area of the cardioid $r = a(1 + \cos\theta)$

14. a) Evaluate $\iint_R (x^2 + y^2) dx dy$ where R is the region in the positive quadrant for which $x + y \leq 1$

(OR)

b) Verify that $\iint_R (x^2 + y^2) dy dx = \iint_R (x^2 + y^2) dx dy$ where the region R is the triangle formed by the lines $y=0, x=1$ and $y=x$

15. a) Evaluate $\int_0^\infty e^{-x^2} x^5 dx$

(OR)

b) Prove that $\sqrt{\frac{1}{2}} = \sqrt{\pi}$

PART - C

ANSWER ANY THREE QUESTIONS

(3X10=30)

16. Evaluate $\int \sqrt{(x-3)(7-x)} dx$

17. Evaluate $\int \sin^7 x dx$

18. Find the area bounded by the parabolas $y^2 = 4ax$ and $x^2 = 4by$

19. Evaluate $\iiint_V (x + y + z) dx dy dz$, where the region V is bounded by $x + y + z = a (a > 0)$, $x = 0, y = 0, z = 0$.

20. Evaluate $\int_0^{\frac{\pi}{2}} \sin^{\frac{7}{2}} \theta \cos^{\frac{5}{2}} \theta d\theta$