

B.Sc DEGREE (CBCS) REGULAR / IMPROVEMENT / REAPPEARANCE EXAMINATIONS, MAY 2024

Second Semester

B.Sc Statistics Model I

Complementary Course - MM2CMT05 - MATHEMATICS-INTEGRAL CALCULUS AND TRIGONOMETRY

2017 ADMISSION ONWARDS

4F2721E8

Time: 3 Hours

Max. Marks : 80

Part A

Answer any **ten** questions.

Each question carries 2 marks.

- 1. Express the sum 1 + 3 + 5 + 7 + 9 in sigma notation in two different index starting values.
- 2. Suppose $\int_{-1}^{1} f(x) dx = 5$. Then find 1) $\int_{1}^{-1} f(x) dx$ 2) $\int_{-1}^{1} 2f(x) dx$
- 3. Find $rac{dy}{dx}$, if $y=\int_{\sqrt{x}}^{0}sin(t^2)dt$
- 4. Find integrals for surface area of the curve, x = sin y, $0 \le y \le \pi$
- 5. Write the formula for surface area in Differential form.
- 6. Evaluvate $\int 10^{2\theta} d\theta$.
- 7. Write formula for integration by parts for two functions.
- 8. Evaluate $\int sinxcosxdx$.
- 9. Express the number $-\sqrt{3} + i$ in the form $r(\cos\theta + i\sin\theta)$
- 10. Define circular function sin x, as a series expansion where 'x' is a complex variable.

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- 11. Define hyperbolic cosine function.
- 12. Define principal value of inverse cosec of x + iy.

(10×2=20)





Part B

Answer any **six** questions.

Each question carries 5 marks.

- 13. State Mean value theorem for definite integrals and find the average value of f(x)= x^2 1 on [0, $\sqrt{3}$]
- 14. Evaluate 1) $\int rac{1}{x^2} cos^2 rac{1}{x} dx$ 2) $\int sec^2 (5x-1) dx$
- 15. Find the length of the curve $y = x^{3/2}$ from x = 0 to x = 4
- 16. Find the length of one arch of the cycloid $x = a(\theta sin\theta)$, $y = a(1 cos\theta)$, $0 \le \theta \le 2\pi$
- 17. Evaluate $\int \frac{1}{1-secx} dx$
- 18. Evaluate $\int rac{2x^3}{x^2-1} dx$
- 19. Evaluate $\int rac{x^2+1}{(x-1)(x-2)(x-3)} dx$
- 20. Separate into real and imaginary parts $tanh(\alpha + i\beta)$
- 21. Sum the series $csin\alpha + \frac{c^2}{2}sin2\alpha + \frac{c^3}{3}sin3\alpha + \dots$ if c is not greater than unity. (6×5=30)

Part C

Answer any **two** questions. Each question carries **15** marks.

- 22. a) Find the total area between the region and x- axis where y = $x^{1/3}$, on $-1 \le x \le 8$ b) Find the area bounded by the x axis and the parabola y = 6 - x - x²
- a) Find the volume of the solid generated by revolving the region bounded by x = √2sin2y 0 ≤ y ≤ π/2, x = 0 about y axis
 b) The region between the curve y = √x, and the lines y = 2 and x = 0 is revolved about the line y = 2 to generate a solid. Find its volume.
- 24. Evaluate 1) $\int e^{2x} cosx dx$ 2) $\int (x^2 + x + 3) e^x dx$

25. If $sin\alpha + sin\beta + sin\gamma = cos\alpha + cos\beta + cos\gamma = 0$. Prove that,

- a) $cos3\alpha + cos3\beta + cos3\gamma = 3cos(\alpha + \beta + \gamma)$
- b) $sin3\alpha + sin3\beta + sin3\gamma = 3sin(\alpha + \beta + \gamma)$

(2×15=30)

