



QP CODE: 26802020



26802020

Reg No :

Name :

INTEGRATED M Sc DEGREE EXAMINATION APRIL 2026

Second Semester

INTEGRATED M Sc BASIC SCIENCES - STATISTICS

COMPLEMENTARY - IST2CM05 - MATHEMATICS II - INTEGRAL CALCULUS AND TRIGONOMETRY

2020 Admission Onwards

65A37985

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

Answer any **eight** questions.

Weight 1 each.

1. Find the values of the following.
 - a) $\sum_{k=1}^2 \frac{k}{k+1}$
 - b) $\sum_{k=1}^3 (-1)^k k$
2. State The Net Change Theorem.
3. Evaluate $\int x(\sin 2x^2) dx$.
4. The circle $x^2 + y^2 = a^2$ is rotated about the x-axis to generate a sphere. Find its cross-sectional area.
5. Write the Shell Formula for Revolution About a Horizontal Line.
6. Evaluate $\int \log x dx$
7. Evaluate $\int \frac{5x-3}{x^2-2x-3} dx$.
8. Write any 4 identities in Hyperbolic Functions.
9. State Binomial Theorem.
10. From the exponential expressions , obtain the values of sinhy and coshy.

(8×1=8 weightage)

Part B (Short Essay/Problems)

Answer any **six** questions.

Weight 2 each.

11. a) State the theorem of symmetric functions.
- b) Evaluate $\int_{-2}^2 (x^4 - 4x^2 + 6) dx$





12. Find the area of the region enclosed by the parabola $y = 2 - x^2$ and the line $y = -x$.
13. a) Define the volume of a solid using cross-section.
b) A pyramid 2 m high has a square base that is 2 m on a side. The crosssection of the pyramid perpendicular to the altitude x m down from the vertex is a square x m on a side. Find the volume of the pyramid.
14. The line segment $x = 1 - y$, $0 \leq y \leq 1$ is revolved about the y -axis to generate the cone. Find its lateral surface area.
15. Write any 10 Basic integration formulas.
16. Evaluate $\int \sin 3x \cos 5x \, dx$.
17. Find the values of $(\cos \frac{\pi}{3} + \sqrt{-1} \sin \frac{\pi}{3})^{\frac{1}{4}}$
18. If $\sin(A + iB) = x + iy$, the Show that $\frac{x^2}{\cosh^2 B} + \frac{y^2}{\sinh^2 B} = 1$.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight 5 each.

19. a) Explain the difference between Definite Integrals and Indefinite Integrals.
b) Evaluate the following
(i) $\sec^2(5t + 1) \cdot 5dt$ (ii) $\int \cos(7t + 3) \, dt$ (iii) $\int \cos^2 x \, dx$
20. Find the length of the following curves
(i) $x = 2y^{\frac{3}{2}}$, $0 \leq y \leq 1$.
(ii) $y = x^{\frac{3}{2}}$, $0 \leq x \leq 4$.
21. a) Evaluate $\int_0^{\frac{3}{2}} \frac{1}{\sqrt{9-x^2}} \, dx$.
b) Evaluate $\int \frac{x^2}{\sqrt{9-x^2}} \, dx$
22. Prove that
(i) $\cosh^2 x - \sinh^2 x = 1$
(ii) $\tanh^2 x + \operatorname{sech}^2 x = 1$
(iii) $\sinh 2x = \frac{2 \tanh x}{1 - \tanh^2 x}$
(iv) $\cosh(x + y) = \cosh x \cosh y + \sinh x \sinh y$

(2×5=10 weightage)

