Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 09

B.Sc (Non Medical) (2018 Batch) (Sem.–2)

INTEGRAL CALCULUS

Subject Code : BSNM-205-18

M.Code : 76303

Time : 3 Hrs. **Max. Marks : 50**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying ONE mark each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Solve the following :

a) Find the length of the arc of the curve $y = x^{\frac{3}{2}}$ from (0, 0) to (4, 8).

b) Evaluate $\int_0^1 \int_0^1 (x+2)\,dy\,dx$.

c) Find the value of $\int_0^1 \int_0^3 \int_0^2 dy\,dz\,dx$.

d) Evaluate $\int \frac{1}{x(x+1)}\,dx$.

e) Evaluate $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin x\,dx$.

f) Show that $\int_0^{\frac{\pi}{6}} \sin^7 3x\,dx = \frac{16}{105}$.

g) Evaluate $\int x^2 e^x dx$.

h) Prove that $\int_\alpha^\beta f(y)\,dx = -\int_\beta^\alpha f(y)\,dx$.

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

j) Write the formula for the volume of the solid generated by the revolution about the x-axis, of the area bounded by the curves $y = f(x)$, $y = g(x)$, and the ordinates $x = a$, $x = b$.

SECTION-B

2. Evaluate $\int \sin^{-1}\sqrt{x}\,dx$.

3. Find the volume of the spindle shaped solid generated by revolving the asteroid $x^{\frac{2}{3}}+y^{\frac{2}{3}}=a^{\frac{2}{3}}$ axis the x-axis.

4. Find the area bounded by the curves $y^2 = 4ax$ and $x^2 = 4ay$.

5. Evaluate $\int \cosh^{-1}\left(\frac{1+x^2}{1-x^2}\right)dx, |x|<1$.

6. Evaluate $\int_0^{\frac{\pi}{2}} \log\sin x\,dx$.

SECTION-C

7. If $U_n=\int_0^{\frac{\pi}{2}} x^n \sin x\,dx, n>1$. Prove that $U_n + n(n-1)U_{n-2} = n\left(\frac{\pi}{2}\right)^{n-1}$. Hence find the value of U_5.

8. Find the volume of a right circular cylinder with base radius r and height h.

9. a) Evaluate $\int_0^1 \int_x^1 \sin y^2\ dydx$ by changing the order of integration.

   b) Evaluate $\iint_R (x^2+y^2)\,dxdy$ where R is the region bounded by the four hyperbolas $x^2 - y^2 = 2, 9$ and $xy = 2, 4$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.