Roll No. | | | | | | | | | | | | | **Total No. of Pages : 03**

Total No. of Questions : 09

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

INTEGRAL CALCULUS

Subject Code : BSNM-205-18

M.Code : 76303

Date of Examination : 22-12-22

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

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks 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) Evaluate $\int \frac{1}{x(x+2)}\,dx$.

b) Evaluate $\int_{\frac{\pi}{2}}^{\frac{\pi}{2}} \cos x\,dx$

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

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

e) Evaluate $\int_0^3 \int_0^1 (x^2 + 3y^2)\,dy\,dx$.

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

g) 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 $x = a$, $x = b$.

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

i) Prove that $\int_a^b f(x)\,dx = -\int_b^a f(x)\,dx$.

j) Evaluate $\int x^3 e^x dx$.

SECTION-B

2. Show that $\int_0^{\frac{\pi}{2}} (2\log\sin x - \log\sin 2x)\, dx = -\frac{\pi}{2}\log 2$.

3. Find the whole length of the curve $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$.

4. Find the area bounded by the curves $y^2 = 16x$ and $x^2 = 16y$

5. Evaluate $\int \frac{1}{3 + 4\sinh x}$.

6. Evaluate $\int \frac{e^{m \tan^{-1} x}}{(1 + x^2)^{\frac{3}{2}}} dx$.

SECTION-C

7. If $I_n = \int_0^{\frac{\pi}{2}} x^n \sin(2p + 1xd)$ prove that $(2p + 1)^2 I_n + n(n-1) I_{n-2} = (-1)^p n \left(\frac{\pi}{2}\right)^{n-1}$, n and p being positive integers. Hence evaluate $\int_0^{\frac{\pi}{2}} x^2 \sin 3x\, dx$.

8. Find the volume of a right circular cone with base radius r and height h by triple integration.

9. a) Evaluate $\int_0^{\infty}\int_x^{\infty} \frac{e^{-y}}{y}\,dydx$ by changing the order of integration.

   b) Find the volume of the solid generated by revolving the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ about the x-axis.

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.