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

Date of Examination : 14-07-22

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 $\int \tan^{-1}x\, dx$.

b) Evaluate $\int \frac{x+1}{\sqrt{x^2-x+1}}\, dx$.

c) Show that $\int_0^{\pi/4} \log(1+\tan\theta)\, d\theta = \frac{\pi}{8}\log 2$.

d) Find the whole length of the asteroid $x^{2/3} + y^{2/3} = a^{2/3}$.

e) Find the area of a loop of the curve $r^2 = a^2 \cos 2\theta$.

f) Find reduction formula for $\int \tan^n x\, dx$.

g) Change the order of integration in $\int_0^a \int_0^{\sqrt{a^2-x^2}} f(x,y)\, dxdy$.

h) Find the value of $dxdy$ when the variables are changed using $x = r\cos\theta$, $y = r\sin\theta$.

i) Evaluate $\int \frac{1}{1+\sin h\, x}\, dx$.

j) Evaluate $\int \text{sech}^{-1}x dx$.

SECTION-B

2. Evaluate $\int \frac{1+x^2}{1+x^4}\,dx$.

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

4. Find the volume of the solid obtained by revolving one arc of the cycloid $x = a\,(\theta + \sin\theta)$, $y = a(1 + \cos\theta)$.

5. Show that the area bounded by the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is $\frac{16}{3}a^2$.

6. Find the volume of the solid bounded by the surfaces $x^2 + y^2 = a^2$ and $x^2 + z^2 = a^2$.

SECTION-C

7. If $I_{m,n} = \int_0^{\pi/2} \cos^m x \cos nx\, dx$, prove that $I_{m,n} = \frac{m(m-1)}{m^2 - n^2}\, I_{m-2,n}$.

8. Evaluate the integral $\iint_R (x-y)^2 \cos^2(x+y)\, dxdy$, where **R** is the region bounded by $(\pi, 0)$, $(2\pi, \pi)$, $(\pi, 2\pi)$ and $(0, \pi)$.

9. Find the volume of the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$.

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.