G. H. Raisoni College of Engineering, Nagpur

(An Autonomous Institution)

Integral calculus and Differential equation

UBSL152

Assignment-1

1. **By using differential under integral sign,**

   evaluate $\int_0^\infty \frac{e^{-x}-e^{-\alpha x}}{x\,secx}\,dx$ **,** $\alpha > 0$**.**

2. **Evaluate** $\int_0^1 \int_0^y xye^{-x^2}\,dx\,dy$

3. **Evaluate** $\int_0^a \int_0^{\sqrt{a^2-y^2}} \sqrt{a^2-x^2-y^2}\,dx\,dy$

4. **Evaluate** $\iint x^2y^2\,dxdy$ **over the area bounded by the ellipse** $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

5. **Evaluate** $\iint_R y\,dxdy$ **where R is the region bounded by the parabola** $y^2 = 4x$ **and** $x^2 = 4y$ **.**

6. **Evaluate the given integral** $\int_0^\infty e^{-kx}x^{n-1}$

7. **Evaluate** $\int_0^2 x(8-x^3)^{\frac{1}{3}}dx$

8. **Prove that** $\beta(m,n) = \beta(n,m)$

Problems on self-study topics:

9. **Find the length of the arc of the curve** $x = 3y^{3/2} - 1$ **from y=0 to y=4.**

10. **Find the area included between the parabola** $y^2 = 4ax$ **and its latus rectum (use simple integration).**

11. **Find the area bounded by ellipse** $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ **(use simple integration).**