PROGRAMME: S.Y.I.T. (SEM-III) **COURSE: APPLIED MATHEMATICS**

TOPIC: D.U.I.S. AND ERROR FUNCTION

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1. $\int_0^\infty e^{-x^2-2bx}\ dx = \frac{\sqrt{\pi}}{2}\ e^{b^2}[1-\text{erf}(b)]$

2. Show that: i) erf (x) + erfc (x) = 1 & ii) erfc (x) + erfc (-x) = 2

3. Define complementary function and show that complementary function is odd

   Function. i.e. erfc (- x) = - erfc (x)

4. Find derivative of error function

5. Find $\frac{d}{dx}\ erfc(ax)$

6. Find $x.\frac{d}{dx}\text{erf}(ax) + a.\frac{d}{dx}\ erfc(ax)$

7. Show that erf(0)= 0

8. Show that $\text{erf}(\infty) = 1$

9. $Show\ that\ \int_a^b e^{-x^2}\ dx = \frac{\sqrt{\pi}}{2}\ [\text{erf}(b) - \text{erf}(a)]$

10. Evaluate: $\frac{d}{da}\int_a^{a^2} \frac{sin(ax)}{x} dx$

11. Show that $\int_{\frac{\pi}{6a}}^{\frac{\pi}{2a}} \frac{sin(ax)}{x} dx$ is independent of a.

12. Evaluate: $\int_{\frac{\pi}{3a}}^{\frac{\pi}{a}} \frac{cos(ax)}{x} dx$

13. Prove that: $\int_0^\pi \frac{\log(ax^2+1)}{x^2}\ dx = \pi\sqrt{a}$

14. Prove that: $\int_0^\infty \frac{e^{-ax}-e^{-bx}}{x}\ dx = \log\left(\frac{b}{a}\right),\ a > 0, b > 0.$

15. Prove that: $\int_0^\infty \frac{1-\cos(ax)}{x^2}\ dx = \frac{\pi a}{2}$

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