

**SCHOOL OF APPLIED SCIENCE & HUMANITIES**  
**DEPARTMENT OF MATHEMATICS**

Subject: Foundations of Engineering Mathematics  
Sem. : Pre-Semester  
Section: 20

Subject Code: 25MT101  
Academic Year: 2025-2026  
Regulation: R25

**Assignment 4**

**30 Marks**

---

1. Solve the differential equation:  $dy/dx + y \tan x = \cos x$ .
2. Find the area bounded by the curve  $y^2 = 4ax$  and the line  $x = a$ .
3. Show that the vectors  $a = i + 2j + 3k$ ,  $b = 2i - j + k$ ,  $c = 3i + j - 2k$  are coplanar.
4. Find the unit vector perpendicular to both  $a = 2i - j + 2k$  and  $b = i + 2j - 2k$ .
5. If  $a = i - j + k$  and  $b = 2i + j - 3k$ , find  $a \times b$  and hence the area of the parallelogram formed.
6. Find the projection of vector  $a = 3i + 4j + 12k$  on  $b = i + j + k$ .
7. If  $\vec{r} = xi + yj + zk$ , show that  $\text{div}(\vec{r}) = 3$ .
8. Verify that  $\text{curl}(\nabla \phi) = 0$ , where  $\phi$  is a scalar function.