VIGNAN'S
FOUNDATION FOR SCIENCE, TECHNOLOGY & RESEARCH
(Deemed to be University) - Estd. u/s 3 of UGC Act 1956

SCHOOL OF APPLIED SCIENCE & HUMANITIES

DEPARTMENT OF MATHEMATICS

Subject: Foundations of Engineering Mathematics | Subject Code: 25MT101

Sem. : Pre-Semester | Academic Year: 2025-2026

Section: 31 | 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 ϕ is a scalar function.