Internal Assesment for UG Mathematics (GE)-2022
Department of Mathematics(UG & PG)
Ramananda College
Semester IV
F.M. 10
TIME 30 MINUTES
Paper Code: SH/MTH/404/GE-4
(Differential Equations & Vector Calculus)

Answers any Two

1. Prove that the scalar triple product of three vectors $\vec{a}$, $\vec{b}$, $\vec{c}$ is equal in magnitude to the volume of parallelepiped, whose three concurrent edges are $\vec{a}$, $\vec{b}$, $\vec{c}$. Find the value of the constant *d* such that the vectors (2,-1, 1), (1, 2,-3) and (3, *d*, 5) are coplanar.
2. If $\vec{a}$ and $\vec{b}$ be two non-collinear vectors such that $\vec{a}=\vec{c}+\vec{d}$, where $\vec{c}$ is a vector parallel to $\vec{b}$ and $\vec{d}$ is a vector perpendicular to $\vec{b}$, then obtain expressions for $\vec{c}$ and $\vec{d}$ in terms of $\vec{a}$ and $\vec{b}$.
3. Find the fixed point of $\dot{x} = \sin x$ and then check the stability at the fixed points 1+4
4. Define Lipschitz function and Lipschitz constant. Show that $f(x,y)=x^2+6y^2$ is satisfies Lipschitz condition in the region S: $|x|\le 3,\ |y|\le 4$. Give an example of a function which does not satisfy Lipschitz condition, justify your answer. 1+2+2