Functions of Several Variable and Differential Geometry 2024 - Minor 4

Maximum Marks : 32

The first question carries 5 marks and all other question carry 3 marks each.

1. Define geodesic, covariant derivative of a tangent vector field respect to a tangent vector, Weingarten map, Circle of curvature, levi-Civita prallel
2. Show that if $\alpha : I \to \mathbb{R}^{n+1}$ is a parametrized curve with constant speed then $\ddot{\alpha} \perp \dot{\alpha}(t)$ for all $t \in I$.
3. Explain the geodesics over in a cylinder.
4. The velocity vector field along a parametrized curve α in S is parallel if anad only if α is geodesic.
5. Explain the well definedness of parallel transport.

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Functions of Several Variable and Differential Geometry 2024 - Minor 2

6. Show that in an n plane parallel transport is path independent.
7. Show that $D_v X = (Xo\alpha)'(t_0)$, where $\alpha : I \to S$ is a paramnetrized curve in S with $\dot{\alpha}(t_0) = v$.

8 Show that if S is an n-surface and N is a unit normal vector field on S, then the Weingarten map of S oriented by $-N$ is the negative of the Weingarten map of S oriented by N.

9. calculate the curvature of the circle with radius r.
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