

**Functions of Several Variable and Differential Geometry 2025 - Minor  
2**

*: Each question carries 4 marks.*

1. Define the following:
  - (a) parametrized curve and integral curve
  - (b) Normal vector field on an  $n$ -surface
  - (c) Connected subset of  $\mathbb{R}^{n+1}$
  - (d) Gauss map
2. The set of tangents at a point of a level set forms a vector space.
3. Explain the positive  $\theta$ -rotation at a point of an oriented 2-surface.
4. Consider the set  $S = \{(x, y) : y \geq 0 \text{ and } x(x-2) + y^2 = 0\} \cup \{(x, y) : x = 2 \text{ and } y \in [2, 4]\} \cup \{(x, y) : y = 0 \text{ and } x \in [-2, 0]\} \cup \{(x, y) : y = 0 \text{ and } x \in [4, 6]\}$ . Can  $S$  be an  $n$ -surface? Justify.

**Functions of Several Variable and Differential Geometry 2025 - Minor  
2**

*: Each question carries 4 marks.*

1. Define the following:
  - (a) parametrized curve and integral curve
  - (b) Normal vector field on an  $n$ -surface
  - (c) Connected subset of  $\mathbb{R}^{n+1}$
  - (d) Gauss map
2. The set of tangents at a point of a level set forms a vector space.
3. Explain the positive  $\theta$ -rotation at a point of an oriented 2-surface.
4. Consider the set  $S = \{(x, y) : y \geq 0 \text{ and } x(x-2) + y^2 = 0\} \cup \{(x, y) : x = 2 \text{ and } y \in [2, 4]\} \cup \{(x, y) : y = 0 \text{ and } x \in [-2, 0]\} \cup \{(x, y) : y = 0 \text{ and } x \in [4, 6]\}$ . Can  $S$  be an  $n$ -surface? Justify.