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| **Student’s Name** | **Student’s ID** | **Group Number** | **Lecturer’s Name** |
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| **Question Number** | **I** | **II** | **III** | **IV** | **V** | **VI** | **Total** |
| **Mark** |  |  |   |  |  |  |  |

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| **Question I:** 1. **For the regular curve**

**find the arc length parameter (arc length function only).**1. **Let be a unit speed curve whose image lies on a sphere of radiusand center. Then prove that Prove, also that if then**

**Where , and and .**1. **If a spherical curve has its curvature and torsion , , then find the radius of the spherical curve.**
 |
| **Question II:**1. **For the unit speed curve**

**Find** 1. **When do we say that a curve is an involute of ?**
2. **Find the involute of the unit speed curve in (a).**

**Question III:** **Prove that a curve is defined uniquely by its curvature and torsion as functions of natural parameters.****Question IV:** **Let be a simple surface defined by , and , be defined by . Then answer the following:****Find the following curvatures**1. **Geodesic curvature . Is a geodesic?**
2. **Normal curvature .**
3. **The curvature of**

**Question V:****For the simple surfaceanswer the following**1. **Find the Weingarten map.**
2. **Show that the Gaussian curvature is constant**
3. **Find the mean curvature.**
4. **Is the surface minimal? Explain your answer.**

**Question VI:**1. **Let be defined by**

**Is a simple surface?** 1. **Let be a simple surface. Then prove the following:**
2. **, where**
3. **For any unit speed curve then**
4. **Show that the tangent planes of the simple surfacewhere is a differentiable function, all pass through the origin.**

Good Luck ☺ |