Assignment

Subject-Mathematics

Semester I

Course-Differential Geometry

Paper Code-DEMATH1ELEC4

Total Marks-25

Group − A

Answer **any one** question from the following questions (15 *marks*)

1. (a) Find the principle curvature of the surface defined by

$$x^1 = u^1 \cos u^2, x^2 = u^1 \sin u^2, x^3 = f(u^1).$$

Also find the condition that, it is a minimal surface.

(b) Prove that $\kappa = 0$ is the necessary and sufficient condition for a surface to be a developable. [10+5 = 15]

2. (a) A curve Γ is define in a cylindrical co-ordinate x^i as follows

$$x^1 = a, x^2 = t, x^3 = bt, b \neq 0$$

where a (> 0) and b are constants and t is a function of the natural parameter s. Find the curvature and torsion of Γ.

(b) Show that a space curve is a straight line if and only if its curvature is zero at all points. [10+5 = 15]

Group − B

Answer **any one** question from the following questions (10 *marks*)

1. Defining a Bertrand curve as a space curve for which $a\kappa + b\tau = 1$, where a and b are non-zero constants with $a > 0$, prove that a circular helix is a Bertrand curve. [10]

2. Find the first fundamental form for the sphere

$$x^1 = u^1 \cos u^2, x^2 = u^1 \sin u^2, x^3 = f(u^1),$$

where f is of class C^2. [10]