EASTERN UNIVERSITY, SRI LANKA

EXTERNAL DEGREE SECOND EXAMINATION IN SCIENCE(2002/2003)

SECOND SEMESTER (Oct./ Nov., 2007)

EXTMT 205 - DIFFERENTIAL GEOMETRY

Answer all questions **Time : One hour**

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1. State and prove the Serret-Frenet formula.

   (a) Prove that the condition of principal normal of a given curve to be binomial to another curve is that $\frac{\kappa^2 + \tau^2}{\kappa}$ must be a constant at every point of the given curve, where κ and τ are the curvature and torsion at any point of the given curve.

   (b) Define "rectifying plane" of a space curve.

   Find the equation for the rectifying plane to the curve $x = t$, $y = \frac{1+t}{t}$, $z = \frac{1-t^2}{t}$ at the point $t = 1$.

2. What is meant by saying that a curve is helix?

   (a) Prove, with the usual notations, that a necessary and sufficient condition for a helix is that $\frac{\tau}{\kappa}$ is constant.

   (b) Show that the curve $\underline{r}(\theta) = e^{\theta}(a\cos\theta,\ a\sin\theta,\ b)$ is ahelix, where a and b are constants.