EASTERN UNIVERSITY, SRI LANKA

DEPARTMENT OF MATHEMATICS

ΓERNAL DEGREE EXAMINATION IN SCIENCE 2008/2009

SECOND YEAR SECOND SEMESTER (Mar./May, 2016)

EXTMT 205 - DIFFERENTIAL GEOMETRY

(Repeat)

er all questions Time : One hour

State and prove Serret-Frenet formula.

Let Γ be a curve with constant torsion τ and a point Q, a constant distance c from the point P on Γ, on the binormal to the curve Γ at P. Show that the angle between the binormal to the locus of Q and the binormal to the given curve Γ is

$$\tan^{-1}\left(\frac{c\tau^2}{\kappa\sqrt{1+c^2\tau^2}}\right)$$

where κ is the curvature of the curve Γ at P.

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

(a) Prove that, a space curve to be a helix if and only if $\dfrac{\tau}{\kappa}$ is constant, where τ and κ are torsion and curvature of the given space curve, respectively.

(b) Show that the curve given by $x = a\cos\theta$, $y = a\sin\theta$ and $z = a\theta\cot\beta$ is a helix, where a and β are constants.

1