Menoufia University **Faculty of Engineering, Shebin El-Kom** **Civil Engineering Department** **First Semester Exam, 2017-2018** **Date of Exam: 13 / 1 / 2018**	Minufiya University	**Subject: Geometric Geodetic Surveying** **Code: CVE535** **Year : Diploma level course, Public Works** **Time Allowed : Three hours** **Total Marks : 100 marks**

Answer all Questions **(Use complete equations & clear sketches)** **[Marks]**

Question (1) **[30]**

a) Compute the mean radius of curvature along the line AB , given that:

$\varphi_A = 29^\circ\ 00'\ 31''\ N$, $\varphi_B = 29^\circ\ 21'\ 19''\ N$,

$\alpha_{AB} = 114^\circ\ 25'\ 18''$, $\alpha_{BA} = 294^\circ\ 31'\ 48''$,

$a = 6378136.992\ m$, $\frac{1}{f} = 298.25723$

b) Using two methods, compute the global mean radius of curvature for the ellipsoid.

Question (2) **[30]**

Given a reference ellipsoid defined by:

$a = 6378136.415\ m$, $\frac{1}{f} = 297.8773$

a) Calculate the mean radius of curvature at point E , if $\varphi_E = 26^\circ\ 00'\ 17''S$,

b) Compute the radius of curvature in the meridian direction for a point at the equator,

c) Determine the radius of curvature at the poles.

Question (3) **[13]**

a) Mention the difference between the 3D-Cartesian and curvilinear coordinates,

b) Explain the relation between the 3D-curvilinear coordinates of a point and the corresponding Cartesian ones; within a given geodetic system.

Question (4) **[14]**

a) Discuss the direct transformation from the local geodetic to the geodetic coordinate systems,

b) Explain the inverse transformation from the geodetic into the local geodetic coordinate systems.

Question (5) **[13]**

a) State the advantages of the 3D- over the 2D geodetic position computations,

b) Clarify briefly the direct and inverse geodetic problems in 3D geodetic computations.

Best Wishes