Menoufia University **Faculty of Engineering, Shebin El-Kom** **Civil Engineering Department** **First Semester Exam, 2016-2017** **Date of Exam: 4 / 1 / 2017**	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) **[25]**

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

$\varphi_E = 46°\ 00'\ 57''\ N$, $\varphi_D = 46°\ 28'\ 22''\ N$,

$\alpha_{ED} = 178°\ 05'\ 13''$, $\alpha_{DE} = 358°\ 17'\ 52''$, $a = 6378136.512\ m$, $\frac{1}{f} = 298.2603$

b) Given that the Earth's radius is $6376.207 km$, use two methods to compute the spheroidal excess of the triangle ABC, if: $AB = 19.312\ km$, $AC = 31.115\ km$, $BC = 39.714\ km$

Question (2) **[25]**

a) Calculate the mean radius of curvature at point C, if $\varphi_C = 27°\ 08'\ 43''S$ and:

$a = 6378136.920\ m$, $\frac{1}{f} = 297.8795$

Then, using two methods, compute the global mean radius of curvature for the ellipsoid.

b) If the difference in geodetic longitude between A, B is $23'\ 17''$, compute the convergence of meridians between the two points, given that:

$\varphi_A = 29°\ 00'\ 47''\ N$, $\varphi_B = 29°\ 15'\ 26''\ N$

Question (3) **[20]**

a) Explain the difference between the 2D- angular and 2D-Mapping coordinate systems,

b) Compare between the 3D- Cartesian and 3D-curvilinear coordinate systems,

c) Explain the essential elements for the transformation betweeen any two 3D- Cartesian coordinate systems.

Question (4) **[15]**

a) Define the direct and inverse geodetic problems,

b) Discuss both the 2D- and 3D-approches in geodetic position computations. State the merits of the 3D-approach.

c) Compare among the local geodetic, geodetic and geocentric coordinate systems.

Question (5) **[15]**

a) Discuss the direct coordinate transformation between the local geodetic and geodetic coordinate systems,

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

Best Wishes