Menoufia University **Faculty of Engineering, Shebin El-Kom** **Civil Engineering Department** **Second Semester Exam, 2017-2018** **Date of Exam: 26 / 5 / 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) **[17]**

a) Explain the difference between the 2D- angular and 2D-Mapping coordinate systems,
b) Compare between the 3D- Cartesian and 3D-curvilinear coordinates,
c) Explain the essential elements for the transformation betweeen any two 3D- Cartesian coordinate systems.

Question (2) **[23]**

a) What are the possible applications of the radius of curvature along a given line?
b) Compute the mean radius of curvature along the line CD, given that:

$\varphi_C = 46^\circ\ 00'\ 57''\ N$, $\varphi_D = 46^\circ\ 28'\ 22''\ N$,

$\alpha_{CD} = 178^\circ\ 05'\ 13''$, $\alpha_{DC} = 358^\circ\ 17'\ 52''$, $a = 6378137.054\ m$, $\frac{1}{f} = 298.1798$

Question (3) **[20]**

a) Mention the main applications of geometric geodesy,
b) Define the 2D- and 3D-direct and inverse geodetic problems,
c) If a reference ellipsoid is used, show the advantages of the 3D-approach over the 2D one.

Question (4) **[23]**

a) Explain the benefits from computing the mean radius of curvature at a specific point,
b) Given a reference ellipsoid with the following parameters:

$a = 6378136.976\ m$, $\frac{1}{f} = 297.5972$

- Calculate the mean radius of curvature at point B, if :

$\varphi_B = 33^\circ\ 19'\ 48''\ S$ & $\lambda_B = 29^\circ\ 00'\ 37''\ W$,

- Compute the mean radius of curvature for a point at the equator,
- Determine the radius of curvature at the poles.

Question (5) **[17]**

a) Compare the local geodetic system with both the geodetic and geocentric systems,
b) Explain how to transform the coordinate components from a geocentric coordinate system into a local geodetic one and vice versa.

Best Wishes