

SCHEDULE I / ITEM 6

October 2008

MAP PROJECTIONS AND CARTOGRAPHY

Note: This examination consists of 8 questions on 2 pages.

Marks

<u>Q. No</u>	<u>Time: 3 hours</u>	<u>Value</u>	<u>Earned</u>
1	<p>a. What are the roles of map projections in cartography?</p> <p>b. What is a geodetic datum? Why is it important in cartography?</p> <p>c. Canadian base maps are produced on a series of projections for each individual province. This is done in order to keep the scale factor distortion in each province to a very low level. A company has just acquired map data and wishes to use only one projection, in order to avoid having discontinuities. Area is not important, as this will be an attribute on the database, but the shapes of features should not have any great distortion. Describe a suitable projection, given the range of latitude as 41°N to 84°N and the range of longitude as 52°W to 141°W.</p>	5 5 10	
2	<p>a. On a UTM projection, calculate the meridian convergence (to the nearest arc second) for point A with latitude ($\phi = 53^\circ 42' 28''$ N) and longitude ($\lambda = 112^\circ 18' 29''$W), given the longitude of the central meridian, $\lambda_0 = 111^\circ$W and the following equation:</p> $\gamma = \lambda \left(1 + \frac{\lambda^2}{3} (1 + 3\eta^2) \cos^2 \phi \right) \sin \phi$ <p>where γ is the meridian convergence, $\eta^2 = e'^2 \cos^2 \phi$, $e'^2 = 0.006739496780$ and $\lambda = \lambda - \lambda_0$.</p> <p>b. Would this convergence change if there was a 3° Transverse Mercator zone in the area with the same central meridian as that used for the UTM? Explain your answer.</p> <p>c. What would be the longitude of a point with the same numeric value for the convergence, but opposite algebraic sign?</p> <p>d. Determine the UTM zone in which point A is located.</p> <p>e. The 3° Transverse Mercator (3TM) zone has the grid easting and the scale factor of the central meridian as 304,800.00 m and 0.99990, respectively. If the 3TM grid coordinates of point A are given as (Northing = 5,953,590.36 m, Easting = 218,434.51 m) and assuming the same central meridian as that used in UTM, calculate the equivalent UTM grid coordinates of the point.</p>	7 3 3 2 5	
3	<p>What are the benefits of electronic map displays (in GIS) over hard-copy maps? How has GIS influenced map reproduction?</p>	6	

4	<p>Explain the characteristics and one important cartographic use of each of the following:</p> <ol style="list-style-type: none"> GIS topology Toporama 	5 4	
5	<p>Typically on a computer-based map, a raster image will be used as a background map while one or more layers of vector data sit on top of the background image as foreground information. Describe vector data with regard to its characteristics, sources, advantages over raster data, and its typical computer file formats.</p>	7	
6	<p>Explain the essential differences between the following terms. Your explanations must demonstrate your understanding of each of the terms.</p> <ol style="list-style-type: none"> Map scale and map generalization. Map reproduction and map dissemination. Gaticule and Grid. Qualitative thematic map and quantitative thematic map. 	4 4 4 4	
7	<p>What are the general sources of uncertainty in mapping? Describe an example of how you would use visual variables such as size and shape to clearly depict data uncertainty in maps. Describe an example of where size would be considered unsuitable for depicting data uncertainty?</p>	7	
8	<ol style="list-style-type: none"> In designing and creating colour Web maps, there are usually some issues about colour that must be addressed. Explain the common issues. Google Earth is an Internet mapping application that shows the globe composed from satellite imagery and near-vertical aerial photographs. You are to use this application to produce a map. <ol style="list-style-type: none"> With the aid of a suitable sketch, describe the projection characteristics of the map produced from this application and explain how, as a surveyor, you would use the map. How is the map produced from this application different from a digital orthophoto map? 	5 5 5	
Total Marks:		100	