ASSOCIATION OF CANADA LANDS SURVEYORS - BOARD OF EXAMINERS
WESTERN CANADIAN BOARD OF EXAMINERS FOR LAND SURVEYORS
ATLANTIC PROVINCES BOARD OF EXAMINERS FOR LAND SURVEYORS

SCHEDULE I / ITEM 6
CARTOGRAPHY AND MAP PROJECTIONS

<u>**February 2001**</u>
(1990 Regulations)
This examination consists of __4__ questions on ___2_ pages   **(Closed Book)**

<u>**Q. No.**</u>   <u>**Time: 3 hours**</u>   <u>**Marks**</u>

Q. No.		Marks
1.	On a UTM projection, calculate the meridian convergence for a point with latitude 53° 42' 28" N and longitude 112° 18' 29" W. Would this convergence change if there were a 3°Transverse Mercator zone in the area with the same central meridian as that used for the UTM? If so, why? What would be the longitude of a point with the same numeric value for the convergence, but opposite algebraic sign?	15
2.	Define the following : a) loxodrome b) grid c) graticule d) meridian convergence e) conformality f) equivalence g) line (or point) of zero distortion h) line scale factor i) elevation scale factor j) developable surface	20
3.	Map projections have a number of characteristics, such as conformality, equidistance and equivalence, which are important when picking a projection for a given map series or use. The effect of these characteristics varies with scale. Explain what characteristics are important in the creation of a cadastral map series, and why the cadastral map series in your province has chosen the map projection that it uses.	15
4.	Below is a description of a new map, which has been created as the third in a series of maps covering the same area and going back a number of decades in time. Answer the following questions based upon this description, and your knowledge of the map making process: a) What is scanning? b) Define raster c) Define vector d) Why would the map makers in this case need to convert from raster to vector (note: the answer is not " because that is what the software needs"!!) e) Why would the contour files have to be automatically joined? f) Why would they have to be geo-referenced?	

g) Explain in your own words the phrase **"*The raster image used for the glacier was created by mosaicing and manipulating the individual monochrome orthophotographs (tif format) in Adobe Photoshop to create the colour image and saving as a compressed file (jpeg format).*"**

h) Explain the differences and apparent anomaly in the last sentence, where there are two file sizes listed, one ten times larger than the other.

i) What are "analogue scribing and masking methods" referred to in the description?

The new map of Breidamerkurjökull in South East Iceland has been produced in a fully digital environment, as compared to the previously published 1945 and 1965 maps which were produced using analogue scribing and masking methods. The base source for the glacial and topographic data was compiled from aerial photographs as a series of film overlays. The contours were extracted digitally from a DTM generated from orthophotographs using an LH Systems Digital Photogrammetric Workstation. The map overlays containing the base data were scanned on a flat-bed scanner to create a line art raster file which was then imported into CorelTrace for automatic raster to vector conversion. The complete map consisted of 47 individual orthophotographs for which approx. 4-6 overlays were created containing the main boundary lines of the glacial landforms and topographic features. The vector files of the base data created in CorelTrace were imported and edited in CorelDraw to produce a fully structured map file. As the contours were to be created digitally for each orthophotograph it was decided to move the final design and production to Adobe Illustrator and utilise Avenza MAPublisher in combination with ESRI ArcView as a means to automatically join and check the geo-referenced contour files. A further reason for moving the design and production to Illustrator was to take advantage of a proven route used in previous maps from an Illustrator file to a digital proof, platemaking and lithographic printing. The raster image used for the glacier was created by mosaicing and manipulating the individual monochrome orthophotographs (tif format) in Adobe Photoshop to create the colour image and saving as a compressed file (jpeg format). The completed Illustrator vector map created a file size of 15Mb with the final map incorporating the raster image of the glacier generating a file size of 150Mb.

50

Total Marks: 100