

**CANADIAN BOARD OF EXAMINERS FOR PROFESSIONAL SURVEYORS  
ATLANTIC PROVINCES BOARD OF EXAMINERS FOR LAND SURVEYORS**

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**SCHEDULE I / ITEM 6**

**March 2007**

**MAP PROJECTIONS AND CARTOGRAPHY**

**Note: This examination consists of 6 questions on 2 pages.**

**Marks**

**Q. No**

Time: 3 hours

Value Earned

1	Discuss the similarities and dissimilarities between the Transverse Mercator projection (Gaussian) and the UTM projection. Pay particular attention to developable surfaces, distortion types, characteristics of projected graticule, origins of map coordinate systems, number of zones, scales of central meridians, false origins, and tangent or secant case. Specifically, what are the two projections used for by the federal government in Canada?	15	
2	<p>a. On a UTM projection, the meridian convergence for point B with latitude <math>53^{\circ} 42' 28''</math> N and longitude <math>-112^{\circ} 18' 29''</math> (or W) is calculated as <math>-1^{\circ} 03' 15.73''</math>. Would this convergence change in a 3TM zone 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? In what UTM zone is the point located? [Central meridian is <math>-111^{\circ}</math> (or W).]</p> <p>b. Let a 3TM zone (having no false eastings and no false northings) and the UTM zone (determined above) have the same central meridian. If the UTM easting of point B is 413,660.42 m, what is the 3TM easting of point B (assuming the 3TM scale factor of the central meridian is 0.99990)?</p>	10	
3	<p>Explain each of the following with respect to their clear meanings and their main applications or uses in cartography.</p> <p>a. Tissot indicatrix b. Shaded relief topographic map c. Orthophotomaps d. Four-color process printing e. Map generalization</p>	15	

4	<p>GPS technology is capable of determining position (latitude, longitude and height) to high standards of accuracy (to the nearest metre) using portable receivers, in a few minutes, day or night, in all weather conditions. This is significantly more accurate than the best base mapping generally available in Canada (1:50,000). Discuss what effect this technology might have on map makers and map users. Explain some aspects of this technology that must be clearly understood by map makers and map users concerning positioning with GPS?</p>	15	
5	<p>a. Explain the differences between traditional CAD (Computer-Aided Design) mapping and GIS (Geographic Information System) mapping.</p> <p>b. Why is it necessary to flatten the earth in GIS?</p> <p>c. Measured field elevations of points can be considered as interval or ratio data. Explain the correctness of this statement.</p>	12 4 4	
6	<p>What are some of the benefits of using computers in cartography? Give your explanation with respect to map design, map production, map presentation, map uses, accessibility to map products and mapping accuracy. What are the “disadvantages” of the computers to cartography as a discipline?</p>	20	
<b>Total Marks:</b>		100	