National Exams December 2014

04-Geom-B1, Digital Terrain Modelling

3 hours duration

NOTES:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.

2. This is a CLOSED BOOK EXAM. Any non-communicating calculator is permitted.

3. TWELVE (12) questions constitute a complete exam paper.

4. Each question is of varying value.

5. Most questions require an answer in essay format. Clarity and organization of the answer are important.
04-Geom-B1
Digital Terrain Modelling
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Marks

1. What is the difference between a
   a) digital terrain model (DTM),
   b) a digital elevation model (DEM) and,
   c) a digital surface model (DSM)? (3 x 2 marks)

2. Define the following in the context of digital terrain modelling (5 x 2 marks)
   a) breaklines,
   b) spot heights,
   c) sampling interval,
   d) elevation data accuracy,
   e) interpolation method.

3. Explain the merits of using the following methods/systems for DEM data generation: (5 x 3 marks)
   a) map digitization,
   b) ground surveys,
   c) aerial photogrammetric methods,
   d) satellite image-based methods,
   e) airborne Lidar.

4. How do the following influence the choice of a DEM sampling interval: (3 x 2 marks)
   a) terrain roughness,
   b) required surface accuracy,
   c) terrain slope?

5. What are the advantages/disadvantages of using regular grid versus irregular data distributions for a DEM in terms of: (3 x 5 marks)
   a) data volumes,
   b) accuracy of surface presentation,
   c) contour generation?

6. Explain the steps that are used to create a triangular irregular network (TIN) when using the data in a DEM.

7. Explain how you could use a DEM for: (2 x 5 marks)
   a) generating a watershed boundary?
   b) determining a floodplain boundary?

8. What is the difference between filtering and smoothing in DEM data processing?
9. How and why is the method of Kriging used for the interpolation of DEM data?

10. Explain how you could mathematically locate and eliminate any blunders in a DEM?

11. How are DEMs used for: (2 x 5 marks)
   a) orthophoto generation,
   b) volume computation?

12. How is DSM data used to rectify digital satellite imagery?

100 Total marks