

Front Page

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**  
**December 2014 Exam**  
**3 hours**

Marks

- 9    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)
- 10   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.
- 15   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.
- 6    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?
- 15   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?
- 5    6. Explain the steps that are used to create a triangular irregular network (TIN)  
    when using the data in a DEM.
- 10   7. Explain how you could use a DEM for: (2 x 5 marks)  
    a) generating a watershed boundary?  
    b) determining a floodplain boundary?
- 5    8. What is the difference between filtering and smoothing in DEM data  
    processing?

- 5 9. How and why is the method of Kriging used for the interpolation of DEM data?
- 5 10. Explain how you could mathematically locate and eliminate any blunders in a DEM?
- 10 11. How are DEMs used for: (2 x 5 marks)
- a) orthophoto generation,
  - b) volume computation?
- 5 12. How is DSM data used to rectify digital satellite imagery?

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100 Total marks