

National Exams December 2016

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. An approved Casio or Sharp model calculator.
3. All 12 questions constitute a complete exam paper totaling 100 marks.

04-Geom-B1
Digital Terrain Modelling
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Marks

- 9 1. What is the primary use of a: (3 x 3 marks)
- a) digital terrain model (DTM),
 - b) a digital elevation model (DEM) and,
 - c) a digital surface model (DSM)?
- 10 2. Define the following in the context of digital terrain modelling (5 x 2 marks)
- a) character/breaklines,
 - b) spot heights,
 - c) sampling interval,
 - d) elevation data accuracy,
 - e) contour interval.
- 6 3. 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 4. 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) airborne Lidar,
 - e) satellite image-based methods.
- 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 representation,
 - 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 digital elevation models used for: (2 x 5 marks)
- a) orthophoto generation,
 - b) volume computation?
- 5 12. How is DSM data used to rectify digital satellite imagery?

100 marks Total