

National Exams December 2015

04-Geom-A7, Geospatial Information Systems

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 is permitted.
3. All questions constitute a complete exam paper total marks equals 100.

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Marks

- 10 1. Define the following in the context of GIS: (5 x 2 marks)
 - a. an entity,
 - b. an attribute,
 - c. precision,
 - d. accuracy,
 - e. topology.

- 5 2. What is the purpose of georeferencing data when using a geospatial information system?

- 10 3. List five justifiable applications that use computer-based geospatial information systems (GISs). (5 x 2 marks)

- 12 4. What are the relative advantages of using vector-based versus raster-based data structures for geospatial information systems in terms of: (6 x 2 marks)
 - a. data storage,
 - b. point precision,
 - c. feature representation,
 - d. feature searching,
 - e. change detection,
 - f. using satellite digital image data.

- 5 5. What type of 2-D coordinate transformation should be used when four corners of a map sheet are digitized? Explain your choice.

- 10 6. During the process of merging several data sets into a GIS it is determined that there are residual geometric distortions. Detail the procedure you would use to deal with (i.e., eliminate and/or minimize) these differences.

- 8 7. When would you use the following for representing geospatial data locations:
 - a. 3-D Cartesian coordinates (e.g., E, N, h)?
 - b. 3-D Geodetic coordinates (e.g., ϕ , λ , h)? (2 x 4 marks)

- 5 8. What are the factors that should be considered when choosing a map projection for displaying GIS data?

- 10 9. In the context of a GIS: (2 x 5 marks)
 - a. What is a TIN?
 - b. What is an entity-relationship data model?

- 5 10. What is the difference between spatial (i.e., geometric) and attribute uncertainty?

- 10 11. In terms of quality control, explain: (2 x 5 marks)
- a. How data uncertainty is represented in a GIS?
 - b. How and why lineage is important for tracking data history in a GIS?
- 10 12. How would you use a GIS to: (2 x 5 marks)
- a. select a location for a retail store?
 - b. determine properties affected by a floodplain?

100 marks Total