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.

Front Page

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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 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