The University of Zambia
School Of Engineering
Department Of Geomatic Engineering

2018/9 Academic Year Second Half
FINAL EXAMINATIONS

GEE 3222: Data Representations and Visualisations

Date: Friday, 22nd Nov 2019

Time: Three (**3**) Hours

INSTRUCTIONS:

1. This examination is **Closed Book**
2. Calculators are permitted
3. **Answer All** questions in Section **A** and **Only One** question in Section **B**
4. Show all the work leading to the solution
5. Total marks for this examination paper is **100**
6. **[ ]** indicate allocated marks for the question

Section A

Question One

Briefly explain the following cartographic terms:

(a) DLM

(b) Type

(c) Bathymetric maps

(d) Cartographic communication

(e) Inkjet printing technique

[5 + 5 + 5 + 5 + 5] Marks

Question Two

a) In any technology dealing with measurements you will encounter the following errors:

(i) Gross errors

(ii) Systematic errors

Clearly explain each of these errors giving their examples in cartography and their remedies.

b) Map revision is a very important task that is usually constrained due to a reduced mapping budget.

(i) Briefly explain why we need up-to-date geo-data.

(ii) Discuss cyclic revision and selective revision policies giving examples of each.

(iii) How can selective revision be based on cyclic revision?

(iv) Why are there more changes on large scale maps than on small scale maps?

[5 + 5 + 4 + 6 + 3 +2] Marks

Question Three

a) Map layout is the spatial arrangement of the various map elements that together make what is called a map on a given medium on which the map is displayed or produced.

   (i) Clarity and order are some of the goals of map layout. List and briefly explain the other three (**3**) goals of map layout.

   (ii) The process of map layout can only start when certain things are known. List and explain any two (**2**) of such preconditions to the map layout process.

   (iii) Among the things that determine a type of map layout is the map scale/accuracy. Briefly explain the relation between the map scale/accuracy to the map layout.

b) List any two (**2**) types of map insets and clearly explain one of them.

c) Briefly discuss at least three (**3**) disadvantages of conventional maps.

[6 + 4 + 4 + 5 + 6] Marks

Section B

Question Four

a) White light is made up of all the components of colour.

(i) Within what wavelength range does a human eye detect colour and what is this range called? 400 – 700nm (visible light)

(ii) List and explain the three (**3**) visual variables of colour.

(iii) Draw and explain the additive colour mixture on a colour model used for computer display.

b) The role of a picture in computer graphics is described as:

(i) An end in itself and

(ii) A means to an end

Explain these two (**2**) concepts clearly giving appropriate examples.

c) Map projections are used to transform the curved surface of the Earth onto a flat plane of the map.

(i) Give and fully explain one (**1**) characteristic of map projections.

(ii) Give and fully explain one (**1**) property of map projections.

(iii) On which four (**4**) things is the selection of a map projection based?

[2 + 6 + 5 + 2 + 2 + 2 + 2 + 4] Marks

Question Five

a) Data visualisation is some form of visual communication that involves creation and study of visual representation of data. Its main goal is to communicate information clearly, efficiently and effectively through graphical means.

(i) Briefly explain the concept of cartographic visualisation.

(ii) State and briefly discuss at least four (**4**) conditions necessary for good and effective cartographic visualisation.

b) You have been tasked by a conservation organization to identify potential habitat for an indigenous bird species only found in the Lower Zambezi National Park based on vegetation type, distance from major roads, climate, slope and elevation.

Data available to conduct this analysis is given as: a map layer of vegetation, major roads, climate zones, slope and elevation layers. A first draft of the analysis would be to:

1. *Select Layer by Attributes* - Select the correct vegetation type from a vegetation map layer.
2. *Buffer* - Create areas within a distance of 1,500 m around major roads.
3. *Erase* - Erase the buffer areas from the selected vegetation areas (using the *erase* tool).
4. *Intersect* - Overlay the output of the *Erase tool* with other map layers, including slope, elevation, and climate zones. This identifies the areas that meet all criteria.

Construct the cartographic model of these four (**4**) steps.

[5 + 8 + 12] Marks

End of Examination

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2018/9 Academic Year Second Half Test

GEE 3222: Data Representations and Visualisations

Time Allowed: **Two** (**2**) hours
Answer: **All** questions

Question One

Briefly explain the following cartographic terms:

(a) Digital Cartographic Model
(b) Texture and Structure
(c) Cartography as an art and a science
(d) Topology
(e) Graphicacy

[5 + 5 + 5 + 5 + 5]

Question Two

a) Using maps as a communication tool, briefly state and explain the **four** (**4**) stages during cartographic processing at which information is lost.

b) Briefly discuss the **three** (**3**) levels of transformation of the Earth's surface in relation to generalisation.

c) When scale is reduced, cartography has to develop its own special language. This requires *selection*, *generalisation* and *symbolisation*. Briefly explain these processes and their significance to cartographic representation.

d) Distinguish between Semantic and Geometric Generalisation?

[8 + 6 + 6 + 5]

Question Three

(a) Briefly explain the **three** (**3**) limits of visual perception.

(b) The choice of colour is influenced by perceptual and psychological factors. Briefly explain these factors by stating an example of each.

(c) Clearly explain the **four** (**4**) levels (or types) of information represented by visual variables. For each case, give an example.

(d) Discuss why geographic information is different from other types of information.

(e) Clearly differentiate between a cartographic and geographic database (geodatabase).

[6 + 4 + 8+ 3 + 4]

Question Four

a) What is geospatial data? Briefly explain how maps are used in visualization and in the process of geospatial analysis.

b) What distinguishes a GIS-system from other mapping systems?

c) Briefly discuss the **four** (**4**) components of GIS and give some examples of some functions of GIS.

d) Define a Map projection. Briefly state the **three** (**3**) characteristics of map projections and for each characteristic, give an example.

[5 + 4 + 8 + 8]

End of Test