

University of Fort Hare

GIS 512

First Semester Special Examination: September 2018

Subject: Geographic Information Systems

Paper: Advanced spatial modelling and analysis

Time: 3 Hours

Marks: 100

Internal Examiner:

Mr. T. Mathe

Ms K R Marembo

External Examiner

Dr. A. R. Palmer

INSTRUCTIONS:

Read all questions carefully

Answer **ALL** questions.

TOTAL PAGES: 3

QUESTION ONE **10**

- a) Explain the importance of MAUP and the Ecological Fallacy in GIS studies. (4)
- b) Explain how weighted models, Analytic Hierarchy Processing (AHP) and fuzzy theories are used in MCE studies. (6)

QUESTION TWO **20**

- a) Write a proposal with problem statement and methodology using MCE to identify the site for a new ABSA banking hall in Alice. [10]
- b) Explain how Eigenvectors & Eigenvalue are used to determine the weights of criteria and how Eigenvalue products are used to determine the ranking of choices. [10]

QUESTION THREE **10**

Differentiate between cellular automata and agent-based geosimulation models.

QUESTION FOUR **15**

In December of 2015, there were major Cholera outbreaks in Mozambique particularly in the province of Nampula. The Mozambican government requires a proximity analysis to be done to discover the source of the outbreak through mapping of the home location of patients from Nampula Provincial Hospital and of suspected sources of contagion. Write a detailed description of the methodology you would follow to perform the proximity analysis.

QUESTION FIVE **10**

Given the four types of networks illustrated in the network analysis lecture, which would you use to represent the following types of data and why;

- a) Street network
- b) Railway network
- c) N1 and N2 road network
- d) Airline network
- e) Gas pipeline network

QUESTION SIX **15**

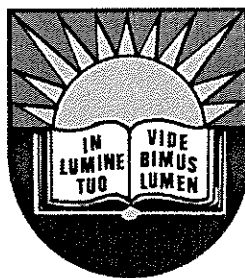
A private firm wants to set up a new hospital in Alice to cater for Alice Town; they are claiming that their ambulances have faster response time than those of the hospitals that

are already set up and to ensure that this is true. They approach you to identify the fastest possible routes to get to different places in Alice and back to the hospital. Using network analysis, write a detailed description of the methodology you would follow to identify the fastest possible routes during peak and off-peak hours.

QUESTION SEVEN**20**

UFH Management is interested in setting up security services within UFH Alice Campus. There has been an increase in crime such as burglaries and rape in the institution due to expansion of University of Fort Hare causing rapid development of Alice town. However, UFH security has not been aware of where the highest rates of crimes are. UFH has approaches you to identify these areas and your boss says you should use the hot spot analysis technique. Write a detailed description of the methodology you would follow to perform the hot-spot analysis of burglaries in Alice Town.

End of Paper



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