DEDAN KIMATHI UNIVERSITY OF TECHNOLOGY UNIVERSITY EXAMINATION ACADEMIC YEAR 2021/2022

FIRST YEAR EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE IN CIVIL ENGINEERING (TRANSPORTATION ENGINEERING OPTION)

ECE 6144: REMOTE SENSING AND GIS FOR TRANSPORTATION ENGINEERING

DATE: 20th January, 2022 **3 HRS** **TIME: 10.00AM**

INSTRUCTIONS: Answer **question one** and any other **three** questions

Question One (30 Marks)

(i) What do you understand by the terms 'models' and 'data modelling' as used in GIS? **(6 marks)**

(ii) Elucidate on the two conceptual models of representing of what is occupying or occurring in a geographic space. **(4 marks)**

(iii) During the process of data capture in GIS, several errors may arise in the resultant spatial and attribute data. Briefly discuss the sources /causes of these errors. **(8 marks)**

(iv) Explain the concept of "interactive spatial selection" as used in GIS. **(6 marks)**

(v) Define and briefly outline the following terminologies in relation to spatial data and GIS

a) Intellectual Property

b) Copyright **(6 marks)**

Question Two (20 marks)

(i) Augmented by an appropriate diagram, describe the capture and processing of spatial data to build a vector database. **(10 marks)**

(i) Outline the factors that affect the quality of spatial data in GIS. **(10 marks)**

Question Three (20 marks)

(i) Define and briefly explain the use of the following terms

(a) Topology

(b) Minimum bounding box

(c) Network **(12 marks)**

(ii) Explain the four levels of abstraction in the representation of the real world in the computer. **(8 marks)**

Question Four (20 marks)

(i) Briefly describe the spaghetti and the topological data structures as used in GIS. **(10 marks)**

(ii) Give the relative merits and demerits of the vector data models/structures as encountered in GIS? **(10 marks)**

Question Five (20 marks)

(i) Discuss the "full raster" data structure, highlighting on how it may be organized for multi-band images. **(10 marks)**

(ii) Outline five application areas of GIS in the transportation sector **(10 marks)**

Question Six (20 marks)

(i) Explain the concept of "spatial selection based on topological relationships" as it applies to spatial analysis with GIS? **(10 marks)**

(ii) Discuss the concept of "ethics" as it applies to the use of GIS and spatial technologies. **(10 marks)**