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(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2023/2024 ACADEMIC YEAR

THIRD YEAR FIRST SEMESTER EXAMINATIONS

MAIN EXAMINATION

FOR THE DEGREE OF
BACHELOR OF SCIENCE IN GEOSPATIAL INFORMATION SCIENCE (GIS)

COURSE CODE: DPG 305

COURSE TITLE: SIMULATION AND MODELING IN GEOSPATIAL INFORMATION SCIENCE

DATE: 06/12/2023 **TIME: 3-5PM**

INSTRUCTIONS TO CANDIDATES

This paper contains **four (4)** questions
Question **one (1) is compulsory {total = 30 Marks}**
Attempt **any other two (2) {total = 40 Marks}** from the remaining questions
Be brief and to the point

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over

SECTION I: COMPULSORY {30 MARKS}

QUESTION ONE

a) What is a Geographical information system (GIS)? (10 marks)

b) Discuss the qualities of a good information system (10 marks)

c) Define Topological modeling and give applications of Topology in Geographical Information System (GIS) (10 marks)

SECTION II: ATTEMPT ANY OTHER TWO (2) QUESTIONS {40 MARKS}

QUESTION TWO

a) What is a conceptual model, illustrate the answer with an example and explain the function of entities (10 marks)

b) In catchment modeling, outline the principles of the HEC- RAS model, and describe how it can be used to determine water out flow from a catchment (5 marks)

c) In modelling a catchment area of a river in a GIS to study the surface outflow and the water quality, discuss the external model features required (5 marks)

QUESTION THREE

a) Describe the fitting of a conceptual catchment model, itemize the data required for the model (5 marks)

b) Define the following terms as used in recording topology.

i. Nodes (3 marks)

ii. Arcs (3 marks)

iii. Polygons (3 marks)

iv. Cardinality (3 marks)

QUESTION FOUR

a) Numerical sensitivity is the process of adjusting parameters that affect the numerical solution to obtain the best solution to the equations while maintaining model stability. Discuss the parameters that are adjusted for sensitivity analysis in catchment modeling (10 marks)

b) One of the things about using an unsteady flow model is to get the model to be stable as well as accurate for the range of events to be modeled. How will you know that you are having a stability problem? (5 marks)

c) How will you solve the stability problem? (5 marks)