



**MASINDE MULIRO UNIVERSITY OF  
SCIENCE AND TECHNOLOGY  
(MMUST)**

**MAIN CAMPUS**

**MAIN EXAMINATIONS**

**2021/2022 ACADEMIC YEAR**

**FOURTH YEAR SECOND SEMESTER  
EXAMINATIONS**

**MAIN EXAMINATIONS**

**FOR**

**THE BACHELOR OF SCIENCE IN DISASTER PREPAREDNESS AND  
ENVIRONMENTAL TECHNOLOGY**

**COURSE CODE: DPE 416**

**COURSE TITLE: GIS II**

**DATE: 28/04/2022**

**TIME: 3 - 5PM**

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**INSTRUCTIONS TO CANDIDATES**

Answer Question 1(ONE) and any other TWO Questions

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over.

### Question ONE (COMPULSORY – 30 MARKS)

- a) Raster reclassification allows you to simplify or aggregate data within a raster dataset. Describe steps for reclassifying a raster dataset using Reclassification tool in ArcGIS. **[4 Marks]**
- b) Supposing the points A ( $0^{\circ} 16'$ ,  $34^{\circ}43'$ ), B ( $0^{\circ} 18'$ ,  $34^{\circ}43'$ ), C ( $34^{\circ} 46'$ ,  $0^{\circ}18'$ ), and D ( $34^{\circ} 46'$ ,  $0^{\circ}16'$ ), define your study area, explain how you would create a shape file so that you can clip different datasets for study area. **[7 Marks]**
- c) Describe the difference between a local, focal and zonal operation on raster layers. **[6 Marks]**
- d) Spatial analysis is the core of GIS. Discuss **[5 Marks]**
- e) Describe how you would delineate watershed and stream network for a particular basin using Digital Elevation Model (DEM) and GIS tools. **[8 Marks]**

### Question TWO

Kakamega County is planning a new park on the northern side. You are hired as a planner to identify possible sites for this future park in an area that is experiencing population growth while also trying to preserve the prime agricultural land of the county. You are given the following guidelines. That the park must be:

Within 10 kilometers of a municipality with population greater than 20,000.

On land that is not zoned as Agricultural, Industrial, Commercial or Conservation.

On land that is currently vacant.

On land that does not contain an endangered species.

On slopes greater than 2.5% (to provide topographic relief for hiking trails as well as scenic beauty).

On land that is accessible from an existing road.

And finally the park must be at least 20 hectares in size.

- a) Write down the data sets (data layers, data themes) that are likely to be needed for such a project and whether they should be vector or raster. **[16 Marks]**
- b) Indicate if the data set would be considered a FRAMEWORK dataset. **[4 Marks]**

### Question THREE

Discuss application of GIS in disaster management. **[20Marks]**

#### Question FOUR

The Universal Soil Loss Equation (USLE) is a conventional model of soil erosion that takes into account climate characteristics, soil properties, topography, surface conditions, and human activities. It predicts the average soil loss attributed to the runoff from various slopes associated with agriculture, rangeland, and other managed land systems (e.g., construction sites).

The equation is  $A = RKLSCP$

where:

A = average soil loss (e.g., tons/acre/year)

R = rainfall runoff erosivity factor (derived from the energy in an average rainfall)

K = soil erodibility factor (average soil loss in tons/acre/year at a standard slope length and steepness)

L = slope length factor S = slope steepness factor

C = crop management factor (effect of crop management factors on soil erosion)

P = support practice factor (determined by contouring, strip cropping, terracing, and subsurface drainage)

Each of the above factors contributes to a simulation of conditions that affect the severity of soil erosion at a particular location.

Explain how GIS enables the model to incorporate the spatial portion of the equation.

**[20 Marks]**

