



MACHAKOS UNIVERSITY

University Examinations for 2021/2022

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO 417: GEOGRAPHIC INFORMATION SYSTEMS

DATE: 10/12/2021

TIME: 11:00 – 1:00 PM

Instructions

This paper consists of FIVE questions

*Answer **question one** and other **two questions** in this paper*

QUESTION ONE (30 MARKS)

- (a) Differentiate the following types of systems:
 - (i) Geographic Information (GIS)
 - (ii) Global Positioning (GPS)
 - (iii) Remote Sensing (RS). (3 marks)
- (b) Discuss the significance of studying GIS as a unit. (3 marks)
- (c) Describe the components of a GIS. (6 marks)
- (d) (i) Briefly explain the THREE broad classifications of the GIS software. (6 marks)
 - (ii) Outline FOUR specific examples of GIS software tools. (4 marks)
- (e) (i) Discuss the difference between Vector and Raster Models used in GIS. (4 marks)
 - (ii) Describe an example of an application area where each one of the two models can be used. (4 marks)

QUESTION TWO (20 MARKS)

- (a) Briefly explain the following tasks performed by a GIS:
- (i) Input
 - (ii) Manipulation
 - (iii) Management
 - (iv) Query and Analysis
 - (v) Visualization
- (10 marks)
- (b) (i) Describe the importance of both layers and frames in GIS software. (4 marks)
- (ii) Discuss how both layers and frames are implemented in a GIS software tool. (6 marks)

QUESTION THREE (20 MARKS)

- (a) (i) State what you understand by the term Geodatabase. (2 marks)
- (ii) Briefly explain any FOUR field types for files that are allowed in a Geodatabase. (8 marks)
- (b) Briefly explain the meaning of the following terms as used in Geodatabases:
- (i) Feature classes
 - (ii) Raster datasets
- (4 marks)
- (c) Querying of a Geodatabase can be realized through the use of SQL components embedded in relational database systems such as POSTGIS. With this in mind, explain the meaning of the following statement used in POSTGIS:
- SELECT s.gid, s.school_name FROM schools s***
- LEFT JOIN hospitals h ON ST_DWithin(s.geom, h.geom, 3000)***
- WHERE h.gid IS NULL;***
- (6 marks)

QUESTION FOUR (20 MARKS)

- (a) The structure of a GPS is said to consist of THREE elements. Briefly describe these three elements. (6 marks)
- (b) Describe FIVE application areas of GIS. (10 marks)
- (c) Discuss how a GIS can help organizations in the following areas:
- (i) improve organizational integration
 - (ii) make better decisions
- (4 marks)

QUESTION FIVE (20 MARKS)

- (a) (i) A GIS is said to make use both spatial as well as attribute data types. Discuss the importance of these two data types in a GIS. (4 marks)
- (ii) Explain TWO examples of application areas for each of the two data types. (8 marks)
- (b) Describe the following types of data resolutions used in remote sensing
- (i) Temporal
 - (ii) Spectrum
 - (iii) Spatial
 - (iv) Radionmetric
- (8 marks)