2901/304
GEOGRAPHIC INFORMATION
SYSTEM (GIS)
Oct./Nov. 2021
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN PETROLEUM GEOSCIENCE

MODULE III

GEOGRAPHIC INFORMATION SYSTEM
(GIS)

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examinations:
Mathematical tables/non programmable scientific calculator $(fx-82)$*;*
Answer booklet.
This paper consists of ***EIGHT*** *questions.*
Answer any question ***ONE*** *and any other* ***FOUR*** *questions in the answer booklet provided.*
Maximum marks for each part of a question are as indicated.
Candidates should answer the questions in English.

This paper consists of 3 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

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1. (a) With the aid of labelled diagrams, explain how the following will be represented as vector data in geographic information system (GIS).

(i) petroleum well; (3 marks)

(ii) petroleum pipeline. (4 marks)

(iii) acreage. (4 marks)

(b) With the aid of labelled diagrams, explain the possible topological relationship that can exist in digitilizing each of the features in (a). (9 marks)

2. (a) Identify the file format for the following types of data:

(i) digitized petroleum pipeline; (1 mark)

(ii) scanned petroleum reservoir map; (1 mark)

(iii) petroleum well GPS point; (1 mark)

(iv) google earth image of acreage; (1 mark)

(v) satellite image of an oil spill area. (1 mark)

(b) (i) Explain **four** hardware components of the GIS. (8 marks)

(ii) I. Define the term 'software' as used in GIS. (1 mark)

II. Outline **four** functions of a GIS software. (4 marks)

(iii) Other than hardware and software, name **two** other GIS components. (2 marks)

3. (a) During a digitilization of a petroleum pipeline exercise, an attribute table was created. State **five** fields that can be created through such a process. (5 marks)

(b) List **five** sources of GIS data. (5 marks)

(c) (i) Define the term 'geodatabases' as used in GIS. (1 mark)

(ii) Explain **three** types of geodatabases. (6 marks)

(d) State three types of GIS software. (3 marks)

4. (a) (i) Explain the phrase 'coordinate system' as used in GIS. (2 marks)
(ii) Explain **four** components of a coordinate system. (8 marks)

(b) (i) Explain the term 'projected coordinate system' as used in GIS. (2 marks)
(ii) List **four** types of datums used in system. (4 marks)

(c) Explain **two** types of datum used in map projections. (4 marks)

5. (a) State **two** data editing capabilities in GIS. (2 marks)

(b) List **four** data measurement values used to represent geographic field. (4 marks)

(c) (i) Explain the term 'tessellation' as used in GIS. (2 marks)
(ii) With the aid of labelled diagrams, explain **two** types of tessellations. (12 marks)

6. (a) (i) Explain the phrase 'global positioning system (GPS). (2 marks)
(ii) Explain the **three** segments of the GPS. (15 marks)

(b) Name **three** locations of the monitoring stations (3 marks)

7. (a) Explain **five** sources of GPS errors. (10 marks)

(b) Explain **five** applications of GPS in geoscience. (10 marks)

8. (a) Explain **four** current trends in GIS. (8 marks)

(b) With the aid of diagrams, explain the following types of vector overlays.

(i) clip overlay. (6 marks)
(ii) union overlay. (6 marks)

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