

2922/201

**EARTH SCIENCE AND ENVIRONMENTAL
INFORMATION SYSTEMS**

Oct./Nov. 2021

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY

MODULE II

EARTH SCIENCE AND ENVIRONMENTAL INFORMATION SYSTEMS

INSTRUCTIONS TO CANDIDATES

You should have an answer booklet for this paper.

*This paper consists of **TWO** sections: **A** and **B**.*

*Answer **ALL** the questions in section **A** and any **THREE** questions from section **B** in the answer booklet provided.*

*Each question in section **A** carries 4 marks while each question in section **B** carries 20 marks.*

Maximum marks for each part of a question are as shown.

Candidates should answer the questions in English.

This paper consists of 4 printed pages.

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

SECTION A (40 marks)

Answer ALL the questions in this section.

1. Name the parts labelled A, B, C and D of a basic communication system shown in Figure 1. (4 marks)

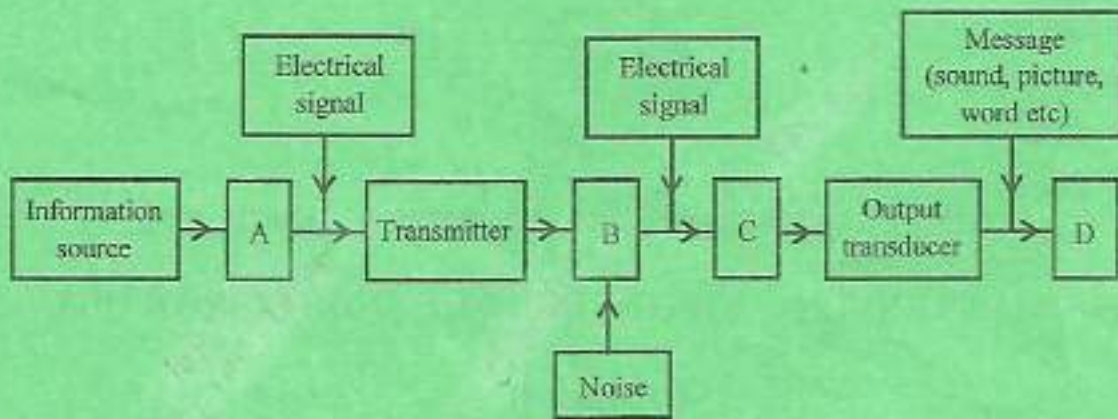


Fig. 1

2. Classify the instruments listed in Table I into active or passive remote sensor. (4 marks)

Table I

Remote sensing instrument	Classification
- Imaging radiometer	
- Radio detection and ranging (RADAR)	
- Laser altimeter	
- Spectrometer	

3. (a) Define beam width as used in RADAR systems. (2 marks)
- (b) State two factors which affect the beam width of a radar system. (2 marks)
4. Explain the importance of regularly adjusting the altitude of a satellite in the orbit. (4 marks)
5. Distinguish between data preparation and data analysis in Geographic Information Systems (GIS). (4 marks)
6. With the aid of a mathematical equation, describe how to determine the distance of a location from a satellite. (4 marks)
7. Outline the four stages in the formation of the earth. (4 marks)

8. Differentiate between syncline and anticline folds based on their:
- (a) structures; (2 marks)
 - (b) patterns. (2 marks)
9. (a) Name two primary elements which constitute the earth's crust core. (2 marks)
- (b) Explain why the inner core of the earth's crust still remains in solid state at temperatures above 3500° C. (2 marks)
10. List four factors which determine the texture of an igneous rock. (4 marks)
- type of rock formed*

SECTION B (60 marks)

Answer any THREE questions from this section.

11. (a) State four characteristics of range folded echoes in RADAR systems. (4 marks)
- (b) Use a labelled diagram to describe folding of a RADAR echo by two consecutive pulses. (6 marks)
- (c) Describe the environmental conditions that favour occurrence of range folded echoes. (4 marks)
- (d) Name six essential components of a RADAR system. (6 marks)
12. (a) Define Geographic Information System (GIS). (2 marks)
- (b) Describe two factors which make GIS distinctive from other information systems. (4 marks)
- (c) Distinguish between datum and projection as used in GIS maps. (4 marks)
- (d) (i) Describe the importance of carrying out enhancement of GIS images. (3 marks)
- (ii) Write a mathematical expression relating the maximum and minimum intensities of a GIS image. (3 marks)
- (e) List any four advantages of using vector data types in GIS. (4 marks)

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13. (a) Describe the application of remote sensing techniques in management of the following habitats:
- (i) coral reefs: (5 marks)
 - (ii) mangroves: (5 marks)
 - (iii) shoreline protection. (5 marks)
- (b) Describe the role of GIS in soil mapping processes. (5 marks)

14. (a) Describe the term fault as used in geology. (3 marks)
- (b) Use labelled diagrams to describe formation of the Rift Valley. (8 marks)
- (c) Explain the relationship between faulting and earthquakes. (6 marks)
- (d) Describe fissure eruption as used in volcanicity. (3 marks)

15. (a) Match the tectonic force with the appropriate type of rock formed shown in Table II. (4 marks)

Table II

Tectonic force	Type of rock
- Melting	Metamorphic
- Extreme temperature and pressure	Igneous
- Weathering and erosion	Metamorphic
- Uplift	Sedimentary

- (b) Use a flow diagram to outline conversion of an igneous rock into a sedimentary rock. (6 marks)
- (c) Distinguish between meteoric and connate types of ground water. (4 marks)
- (d) Describe the local consequences of deforestation. (6 marks)

Lack of green vegetative cover
 Inadequate rainfall
 Causes soil erosion
 Air borne diseases
 destruction of home for some wild animals

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