

2528/201
2922/201
EARTH SCIENCE AND
ENVIRONMENTAL INFORMATION SYSTEMS
June/July 2018
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
DIPLOMA IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY
MODULE II

EARTH SCIENCE AND ENVIRONMENTAL INFORMATION SYSTEMS

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Non-programmable scientific calculator.

*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 5 printed pages.

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

SECTION A (40 marks)

Answer ALL the questions in this section.

1. List four types of communication systems. (4 marks)
5- satellite
2. Distinguish between active sensors and passive sensors. (4 marks)
4
3. Identify the parts labelled A, B, C and D of the pulsed RADAR system shown in Figure 1. (4 marks)



Fig.1

4. (a) Name two sources of radiation that can be detected by the satellite. (2 marks)
1
- (b) Write a Mathematical expression showing the amount of radiation emitted by a grey body. (2 marks)
math
5. List four types of distortions on a map resulting from the process of projection. (4 marks)
6. Explain the benefits of using global positioning systems (GPS) in monitoring earthquakes. (4 marks)
1
7. (a) State the challenge faced by scientists studying young stars in the formation of solar system. (2 marks)
2
- (b) Describe the measure that can be taken by the scientists to overcome the challenge stated in (a) above. (2 marks)
8. (a) Define the term 'fold' as used in earth science. (2 marks)
2
- (b) Describe the position of the rock layers in a fold in terms of their ages. (2 marks)

Its a object detecting system

9. Differentiate between block lava andropy lava structures in igneous rocks. (4 marks)
10. Explain the factors that cause fluctuations in the water table. (4 marks)

Global Positioning System

SECTION B (60 marks)

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②
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Passing

Answer any THREE questions from this section.

11. (a) Define the term 'remote sensing'. (4 marks)
- (b) (i) Describe the working principle of the light detection and ranging (LIDAR) technique used in remote sensing. (4 marks)
- (ii) Explain three advantages of LIDAR system in enforcing speed limits of vehicles. (6 marks)
- (c) Explain the conditions that makes a camera work as:
- (i) an active sensor; (3 marks)
- (ii) a passive sensor. (3 marks)

without current ④ POSITION

7
4

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2

Pass light

11
20
31
17
48

NOICE

12. (a) Match the radar band with the correct frequency shown in Table I. (7 marks)

Table I





Radar band	Frequency
UHF	3 - 30 MHz
X	27 - 40 GHz
K _a	300 - 1000 MHz
HF	2 - 4 GHz
S	8 - 12 GHz
K _a	12 - 18 GHz
L	1 - 2 GHz

IMMEDIATE EXAMINER

- (b) Describe six features that a radar operator can use to differentiate between real reflectivity and range fold reflectivity. (6 marks)
- (c) The range normalized value, z, of reflectivity of a radar system is $65,000 \text{ mm}^6 \text{ m}^{-3}$.
- (i) Determine the decibels of reflectivity (dBz). (3 marks)
- (ii) State the type of precipitation associated with the value obtained in c (i). (2 marks)
- (d) Name two main types of display systems used in meteorology. (2 marks)

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13. (a) Using labelled diagrams, describe:
- (i) normal faulting that produce a horst and graben;  (5 marks)
 - (ii) strike-slip fault.  (3 marks)
- (b) Describe the fissure vent of a volcano.  (3 marks)
- (c) With the aid of a labelled diagram, explain the 'normal graded bedding' as used in geology. (5 marks)
- (d) Explain the following features that show evidence of continental drift:
- (i) ancient fossils; *log here*  (2 marks)
 - (ii) distribution of permo-carboniferous glacial sediments. (2 marks)
14. (a) Figure 2 shows the classification of minerals. Name the components labelled A, B, C, D and E. (5 marks).

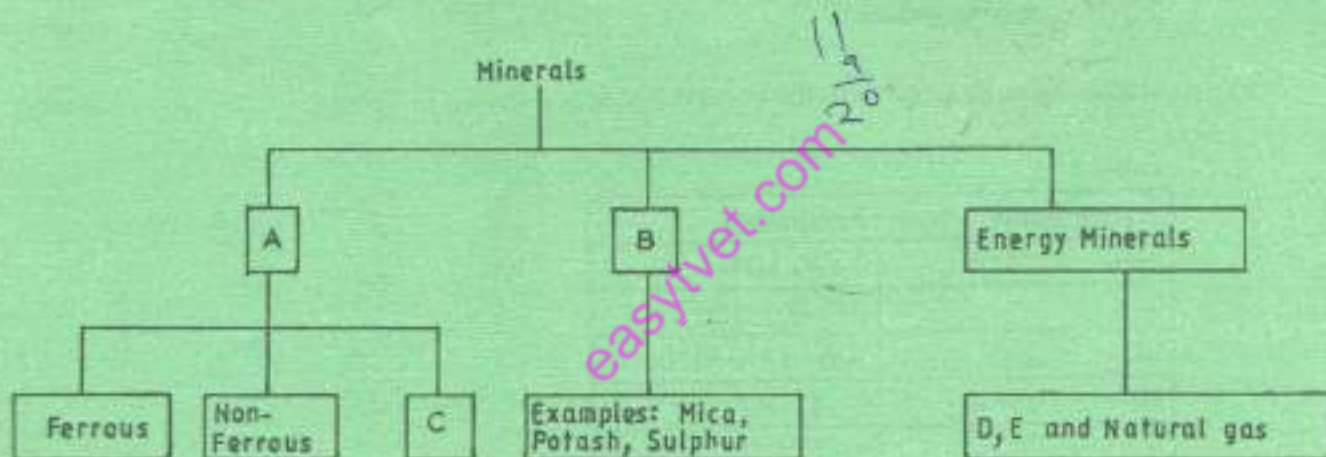



Fig. 2

- (b) Describe the formation of the following types of ground water:
- (i) meteoric water;  (3 marks)
 - (ii) magmatic water. *4* (3 marks)
- (c) List six factors that control the type, rate and extent of weathering in rocks. *4* (6 marks)
- (d) Write a balanced chemical equation that shows the introduction of sunlight energy into the biosphere. (3 marks)

15. (a) Define 'global positioning system (GPS)'. *Navigation* (2 marks)
- (b) Outline the working principle of GPS. *vehicle boats* (5 marks)
- (c) Describe the use of GPS technology in monitoring the following:
- (i) mapping environmental resources; (4 marks)
 - (ii) hydrogeology; (3 marks)
 - (iii) hazardous waste. (4 marks)
- (d) Explain the significance of the receiver component of a GPS system. (2 marks)

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