

2528/201

2922/201

**EARTH SCIENCE AND ENVIRONMENTAL  
INFORMATION SYSTEMS**

June/July 2020

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 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)

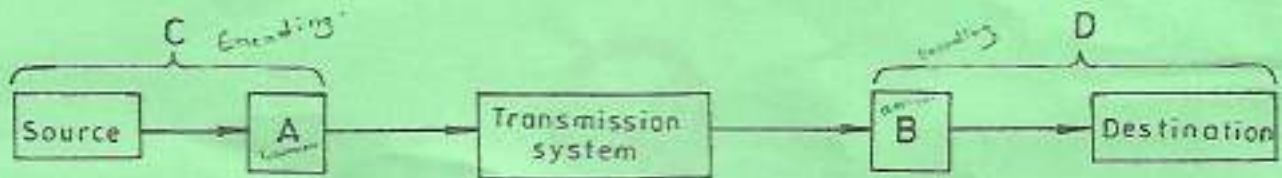


Fig.1

2. Explain two advantages of the type of remote sensing system shown in Figure 2. (4 marks)

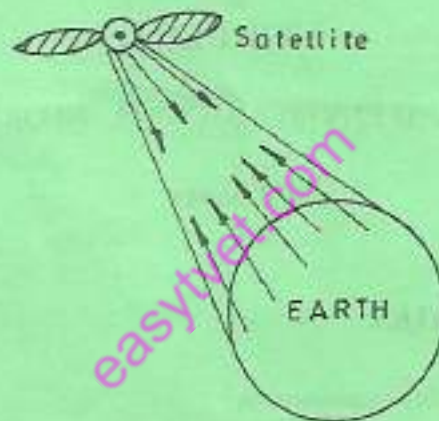


Fig.2

3. (a) Write the full name for the acronym RADAR. (1 mark)  
(b) State three major applications of RADAR system in air traffic control. (3 marks)
4. Explain the interaction between visible solar radiation and atmospheric gases. (4 marks)
5. Differentiate between raster data and vector data used in Geographic Information Systems (GIS) in relation to:  
(a) data representation; (2 marks)  
(b) continuity. (2 marks)
6. Describe how a global positioning system (GPS) receiver determines its distance from the satellites. (4 marks)



7. Name the parts labelled K, L, M and N of the earth's lithosphere shown in Figure 3. (4 marks)

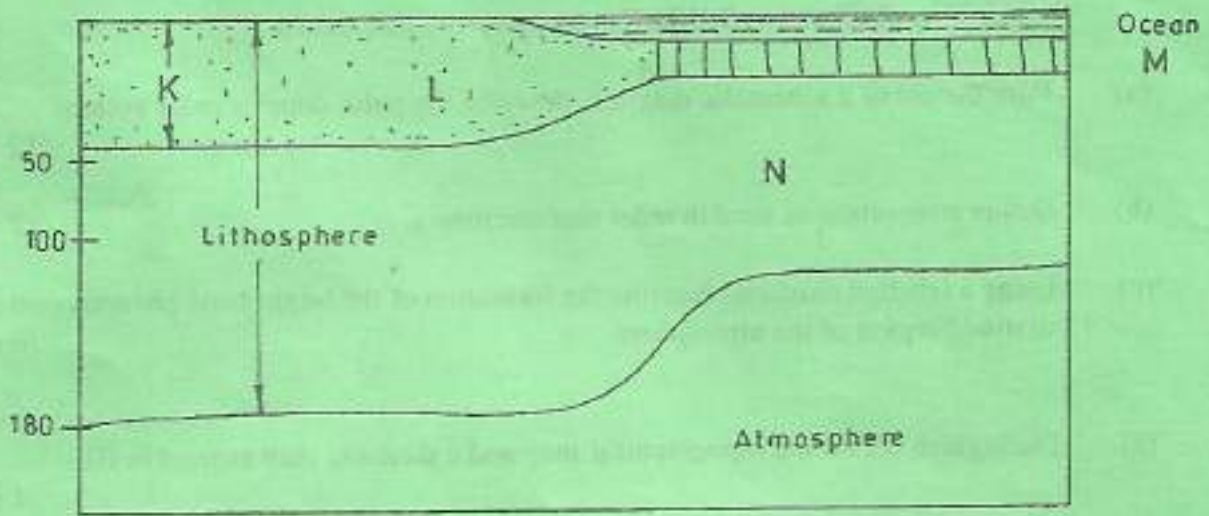


Fig.3

8. Complete the travel paths of the P and S seismic waves into the inner core of the earth's structure shown in Figure 4. (4 marks)

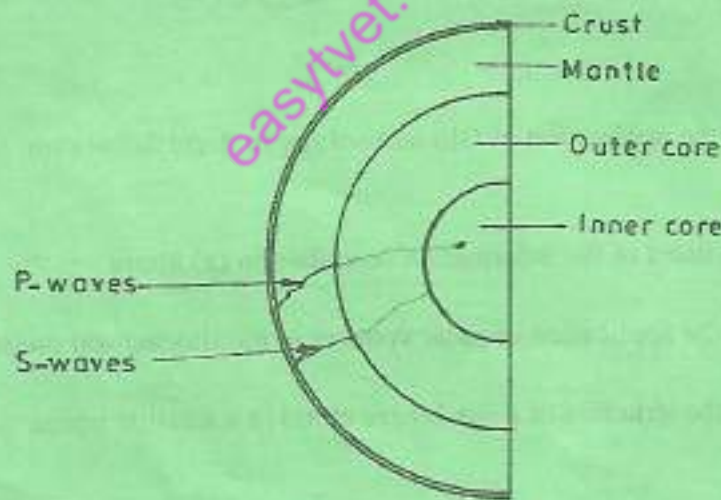


Fig.4

9. Distinguish between the following elements of a fold:
- (a) wavelength and amplitude; (2 marks)
- (b) axial plane and axial trace. (2 marks)

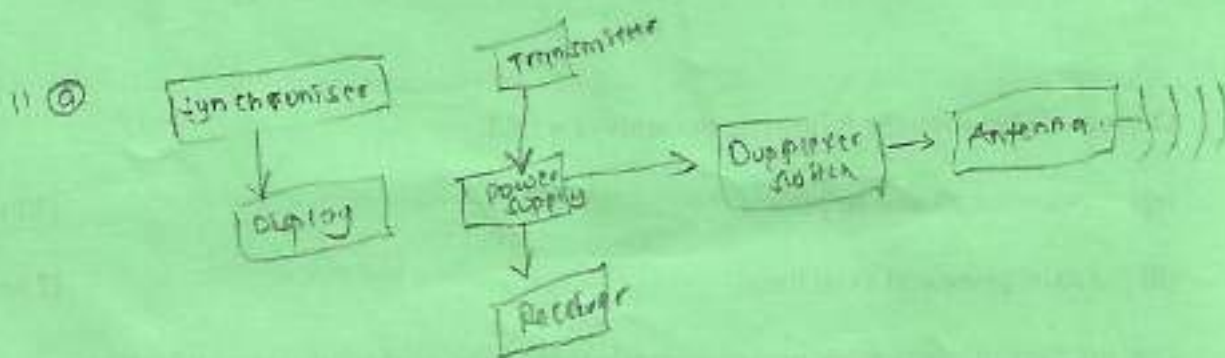
10. List any four physical properties of minerals that can be used for their identification. (4 marks)

*Color  
Lustre  
Density  
Streak*

SECTION B (60 marks)

Answer any **THREE** questions from this section.

11. (a) With the aid of a schematic diagram, describe the pulse doppler radar system. (12 marks)
- (b) Define attenuation as used in radar measurements. (2 marks)
- (c) Using a labelled diagram, describe the formation of the bright band phenomenon in the stratified region of the atmosphere. (6 marks)
12. (a) Distinguish between a topographical map and a thematic map as used in GIS. (4 marks)
- (b) Describe three factors which necessitate the use of projections in GIS maps.  
 i. inclination at  $90^\circ$  in above the earth  
 ii. The GIS must move at the same speed of the earth  
 iii. (6 marks)
- (c) Explain the importance of adjusting the range and distribution of brightness in a GIS image. (6 marks)
- (d) Outline the process of carrying out unsupervised classification of GIS data.  
 Data Identification  
 ↓  
 Storage  
 ↓  
 Analysis and manipulation → Data Output (4 marks)
13. (a) Describe the application of GIS technology in flood delineation and mapping. (4 marks)
- (b) Name six users of the information described in (a) above. (6 marks)
- (c) Describe the application of radar systems in monitoring soil moisture. (6 marks)
- (d) Describe the structure of a sea-breeze cloud in a satellite image. (4 marks)





14. (a) Name the parts labelled P, Q, R, S T, and U in geologic fault diagram shown in Figure 5. (6 marks)

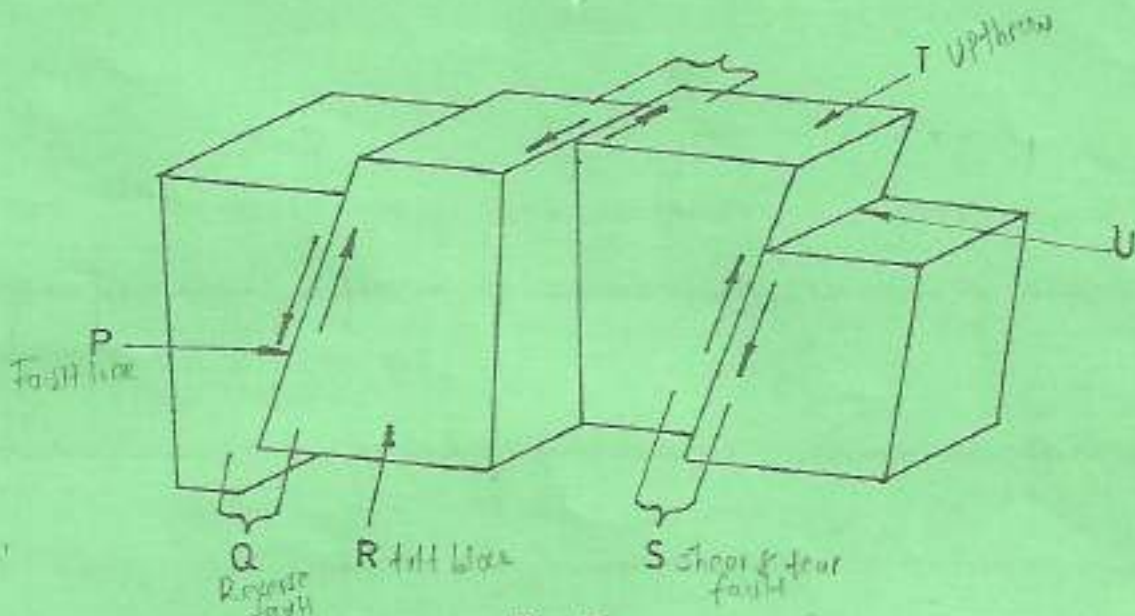


Fig.5

- (b) (i) Distinguish between magma and lava as used in volcanicity. (4 marks)
- (ii) Describe two classifications of igneous rocks. (6 marks)
- (c) State four pieces of evidence that support the theory of continental drift. (4 marks)
15. (a) With the aid of a labelled diagram, explain the effect of excessive extraction of groundwater on the level of water table. (12 marks)
- (b) Distinguish between physical weathering and chemical weathering. (4 marks)
- (c) Explain the relationship between an earthquake and a tsunami. (4 marks)
- Earth quake is shaking & trembling of earth crustal rocks due to shock waves that originate from earth interior.

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