

2528/301
2922/301
ATMOSPHERIC SCIENCE
June/July 2019
Time: 3 hours



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

ATMOSPHERIC SCIENCE

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 indicated.

Candidates should answer the questions in English.

This paper consists of 4 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 from this section.

1. Distinguish between permanent gases and variable gases. (4 marks)
2. Explain why temperature increases with height in the stratosphere. (4 marks)
3. Explain the phenomenon that in winter a bridge gets covered with ice before the rest of the road. (4 marks)
4. List any **four** factors that lead to formation of radiation inversion. (4 marks)
5. (a) Describe the change in absolute humidity of an air parcel that is rising and expanding. (2 marks)
(b) Explain the suitability of absolute humidity as a moisture variable. (2 marks)
6. Explain why frost forms:
(a) close to the ground surface; (2 marks)
(b) on clear and calm nights. (2 marks)
7. State **four** properties of warm, tropical cumulus clouds that make them precipitate. (4 marks)
8. Distinguish between accretion and aggregation growth processes in cold clouds. (4 marks)
9. Explain the danger of flying an aircraft into a thunderstorm characterised by wind shear. (4 marks)
10. Describe the formation of the red colour observed at sunset on clear sky. (4 marks)



SECTION B (60 marks)

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



11. ✓ (a) Draw a temperature versus time plot to illustrate the diurnal variation of incoming solar radiation in a typical day. (7 marks)
- (b) With the aid of a labelled diagram, describe the fundamental process of daytime warming. (13 marks)
12. ✓ (a) Explain the effect of coriolis force on:
- (i) a high speed train travelling from Nairobi to Mombasa; (2 marks)
 - (ii) ocean currents. (2 marks)
- (b) Compare the magnitude of coriolis force on an aircraft flying along the equator and another flying along the North pole. (3 marks)
- (c) Use a schematic diagram to explain formation of a sea breeze during a hot afternoon. (13 marks)
13. ✓ (a) List any **four** natural sources of condensation nuclei. (4 marks)
- (b) Differentiate between dry haze and wet haze with respect to their formation. (4 marks)
- (c) Outline the process of forming advection fog. (5 marks)
- (d) Name the types of clouds labelled A, B, C, D and E shown in Figure 1. (5 marks)

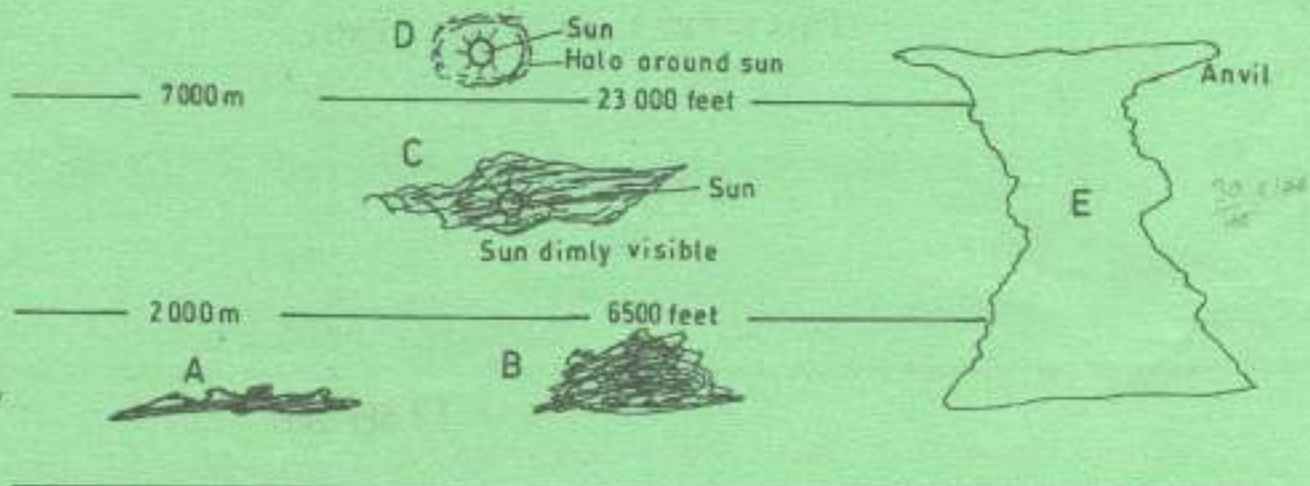


Fig.1

- (e) State two types of satellites commonly used in monitoring weather. (2 marks)

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14. ✓ (a) Explain the impact of the industrial revolution on global warming. (6 marks)
- (b) Describe the contribution of each of the following factors to climate change:
- (i) deforestation; (4 marks)
- (ii) thermal generation of electricity. (4 marks)
- (c) Describe the effect of large amounts of tropospheric aerosols on climate change. (6 marks)
15. (a) (i) State **three** requirements for thunderstorms to form. (3 marks)
- (ii) With the aid of a labelled diagram, describe the developing stage of a thunderstorm. (7 marks)
- (b) State **four** features of the eye of a hurricane. (4 marks)
- (c) Describe **three** features that distinguish between a tropical depression and a tropical storm. (6 marks)

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