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2528/301
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ATMOSPHERIC SCIENCE
Oct./Nov. 2018
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 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.

SECTION A (40 marks)

Answer ALL questions in this section.

1. Name any **four** variable gases in the atmosphere. (4 marks)

2. Explain the importance of adjusting the power output at sunset in a radio station transmitting the amplitude modulating (AM) waves. (4 marks)

3. Draw a curve showing the annual average temperature variation in the Northern hemisphere. (4 marks)

4. Match the estimated residence time with the appropriate source of water shown in table 1. (4 marks)

Table 1

Source of water	Estimated residence time
- Atmospheric water	2 weeks
- Oceans and seas	10 days
- River channels	2 weeks to one year
- Soil moisture	4000 years

5. Differentiate between hygroscopic and condensation nuclei. (4 marks)

6. (a) Name **two** types of clouds that are formed from unstable air parcels. (2 marks)

   (b) State **two** ingredients necessary in the formation of clouds. (2 marks)

7. Explain why surface winds blowing over the oceans are close to being geostrophic. (4 marks)

8. Distinguish between the climatic conditions experienced in the **A** and E zones of the Koppen scheme. (4 marks)

9. Explain the appearance of the blue sky when the sun is overhead. (4 marks)

10. Explain any **two** limitations of using the statistical method to predict weather patterns. (4 marks)

SECTION B (60 marks)

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

11. With the aid of labelled diagrams, describe the following lifting mechanisms:

    (a) topographic lifting; (10 marks)

    (b) convergence lifting. (10 marks)

12. (a) (i) Draw a labelled diagram of the atmosphere showing temperature variations within its layers. (10 marks)

(ii) Explain the importance of the second layer to humans. (3 marks)

(b) (i) Define the term 'temperature inversion'. (3 marks)

(ii) Explain the relationship between temperature inversion and atmospheric pollution. (2 marks)

(iii) Explain why fog usually forms in mountain valleys. (2 marks)

13. (a) Draw a labelled diagram of a mercury barometer. (6 marks)

(b) State **three** factors that affect wind flow. (3 marks)

(c) Use a labelled flow diagram to illustrate formation of a land breeze. (7 marks)

(d) Differentiate between land breeze and sea breeze in terms of their:

(i) time of occurrence; (2 marks)

(ii) moisture content. (2 marks)

14. (a) Describe the use of the following sources of information in understanding past climates.

(i) ocean sediment cores; (3 marks)

(ii) tree ring widths; (3 marks)

(iii) glaciers. (3 marks)

(b) Explain the effect of climate change on global fish resources. (6 marks)

(c) Explain the importance of increasing tree forest cover on climate change. (5 marks)

(a) Describe the difference between cloud droplets and rain droplets. (3 marks)

(b) (i) With the aid of a labelled diagram, describe the collision process in the growth of cloud droplets. (11 marks)

(ii) Use a labelled diagram to illustrate the ice-crystal process in the growth of cloud droplets. (6 marks)

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