UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

FIRST SEMESTER EXAMINATIONS, NOV. – DEC. 2018

COURSE NO: ES 275

COURSE NAME: METEOROLOGY

CLASS: ES II **TIME: 2 HOURS 30 MINUTES**

Name**:** _____Index Number: _____

<u>Section A</u> (20 marks)

Answer ALL questions *(Write short answers in the answer booklet)*

1. …… meteorology is concerned with the forces that create and maintain motion and the heat transformation associated with it.

2. The atmosphere is defined as ……

3. The thermosphere is situated at a height of ……. Above the earth's surface

4. A strong wind is blowing from Sunyani towards Kumasi. If the air pressure in Kumasi is 1008 mb, what is the likely air pressure in Sunyani

   a. 1004 mb
   b. 1000 mb
   c. 1020 mb
   d. 1008 mb

5. The study of climates is known as ……

6. The term "stratus" means ……..

7. The weight of actual amount of water vapour present in a unit volume of air is ……..

8. If the air temperature in Tarkwa decreases, what will happen to the surface pressure?

9. At a height of 300 m above sea level, the atmospheric pressure is 0.6 b. Calculate the air temperature is the air density is 800 g/cm^3 (C=2.87).

10. The ……. force affects the direction of wind and not its speed.

11. Which is a medium cloud

a. Altostratus
b. Lenticular
c. Cirrostratus
d. Stratocumulus

12. …….. fog is formed by cooling of the earth's surface at night.

13. Oxygen starvation which can occur in the mesosphere is also called ……

14. A cyclone is an area where atmospheric pressure is ……

15. Station pressure is ……

16. …….. is an inward directed force that affects air movement

17. Wind direction is measured with ……

18. The aerovane measures ……

19. …… is the temperature at which air will have to cool in order to reach saturation

20. Which atmospheric layer has most of the clouds?

Section B (60 marks)

ANSWER QUESTION ONE AND ONE OTHER QUESTION

Question One [Total of 40 Marks]

a. Define the following terms;

   i. Exosphere
   ii. Air pressure
   iii. Air mass
   iv. Front

[8 Marks]

b. The atmospheric pressure in Tarkwa township is 1020 mb and that of Bogoso which is 35 km away is 1016 mb.

   i. In which direction, will the wind blow?
   ii. Calculate the pressure gradient
   iii. If Kumasi, which is 205 km away from Tarkwa also has a pressure of 1016 mb, calculate the pressure gradient
   iv. Will there be a difference in the winds blowing between Tarkwa and Bogoso versus wind blowing between Tarkwa and Kumasi? Explain your answer.

[5 Marks]

c. Give two importance each of the following gases present in the atmosphere;

   i. Nitrogen
   ii. Argon
   iii. Water vapour **[6 Marks]**

d. Differentiate between the following as applied to meteorology;

   i. Heterosphere and homosphere
   ii. Ridge and trough
   iii. Onshore and offshore wind
   iv. Depression and anticyclone **[8 Marks]**

e. Briefly describe the vertical structure of the atmosphere **[5 Marks]**

f. Beposo and Begro have the same number of air molecules covering them. The air over Begro is cooled to 15 ^{o}C whilst that over Beposo is warmed to 35 ^{o}C. Which city will have a higher pressure aloft? Explain your answer. **[5 Marks]**

g. "Warm air aloft is associated with low atmospheric pressure and cold air aloft is associated with high atmospheric pressure". True or False? Explain your answer **[3 Marks]**

Question Two [Total of 20 Marks]

a.
   i. State the four forces that affect the horizontal movement of air **[2 Marks]**
   ii. State Newton's first and second laws of motion **[2 Marks]**
   iii. The level of deflection observed in wind direction is dependent on three factors. Briefly explain these **[6 Marks]**

b. The people of Nkamponasi, a suburb of Tarkwa want to construct a landfill to help with the management of solid waste. As an environmental and safety engineering professional, how will knowledge about wind speed and direction help in your work? **[4 Marks]**

c. Explain how the following mechanisms lead to cloud formation;
   i. Uplift along weather fronts
   ii. Widespread ascent due to the flowing together of surface air **[4 Marks]**

d. Explain the Bergeron Theory of precipitation **[2 Marks]**

Question Three [Total of 20 Marks]

a. Name two clouds under the following categories;
   i. High clouds
   ii. Low clouds
   iii. Rain bearing clouds **[3 Marks]**

b. Briefly explain how the following types of fog form;
   i. Valley fog
   ii. Radiative fog **[4 Marks]**

c. Which three factors affect the life history of an air mass? **[3 Marks]**

d. Winds on a surface weather map do not exactly blow parallel to isobars but cross the isobars from higher to lower pressure. Explain this phenomenon **[4 Marks]**

e. i. State three (3) characteristics of tropical revolving storms **[3 Marks]**
   ii. List three (3) effects of tropical revolving storms **[3Marks]**

Examiner: Jennifer MacCarthy
Second Examiner: S. Fosu