



**UNIVERSITY OF JOHANNESBURG**

**DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL MANAGEMENT & ENERGY STUDIES**

**MODULE: GR3AFET Geography for Education**

**CAMPUS: APK**

**SEMESTER TEST 2: MAY 2021**

**DATE: 18 MAY 2021**

**ASSESSORS:**

**Ms D Greenberg**

**INTERNAL MODERATOR:**

**Prof. C Kelso**

**EXTERNAL MODERATOR:**

**Dr J Giddy (UMP)**

**DURATION: 90 minutes**

**MARKS: 90**

**PAGES INCLUDING COVER:**

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**SURNAME AND INITIAL:** \_\_\_\_\_

**STUDENT NUMBER:** \_\_\_\_\_

**Please read the following instructions carefully:**

1. Answer ALL questions
2. Question 1 must be completed on the question paper.
3. Question 2 and 3 must be completed in the answer booklet.
4. Please number your answers clearly
5. For the purpose of this test, you may use bullet points EXCEPT for the essay in Question 3 where you must use full sentences and paragraphs.
6. This question paper MUST be handed in with your test script.

**QUESTION 1 – FILL IN THE ANSWERS IN THE SPACES PROVIDED**

1.1) When classifying air masses, what do the following acronyms represent: (8)

- a) mE \_\_\_\_\_ **maritime Equatorial**
- b) cT \_\_\_\_\_ **continental Tropical**
- c) cAA \_\_\_\_\_ **continental Antartctic**
- d) mP \_\_\_\_\_ **maritime Polar**

1.2) List the five elements which contribute to the weather (5)

**Temperature**

**Air pressure**

**Relative humidity**

**Wind speed and direction**

**Seasonal factors such as insolation and Sun angle**

1.3) List and briefly describe the four types of atmospheric lifting and give the typical geographic characteristics associated with each. (12)

**Convergent lifting (1)**

**results when air flows toward an area of low pressure. (1)**

**Common in equatorial regions. (1)**

**Convectional lifting (1)**

**happens when air is stimulated by local surface heating. (1)**

**Occurs where air from maritime sources passes over warmed land surface or even in urban heat islands. (1)**

**Orographic lifting (1)**

**occurs when air is forced over a barrier such as a mountain range. (1)**

**Occurs in areas with large topographic relief. (1)**

**Frontal lifting (1)**

**occurs as air is displaced upward along the leading edges of contrasting air masses. (1)**

**Occurs where air masses meet. (1)**

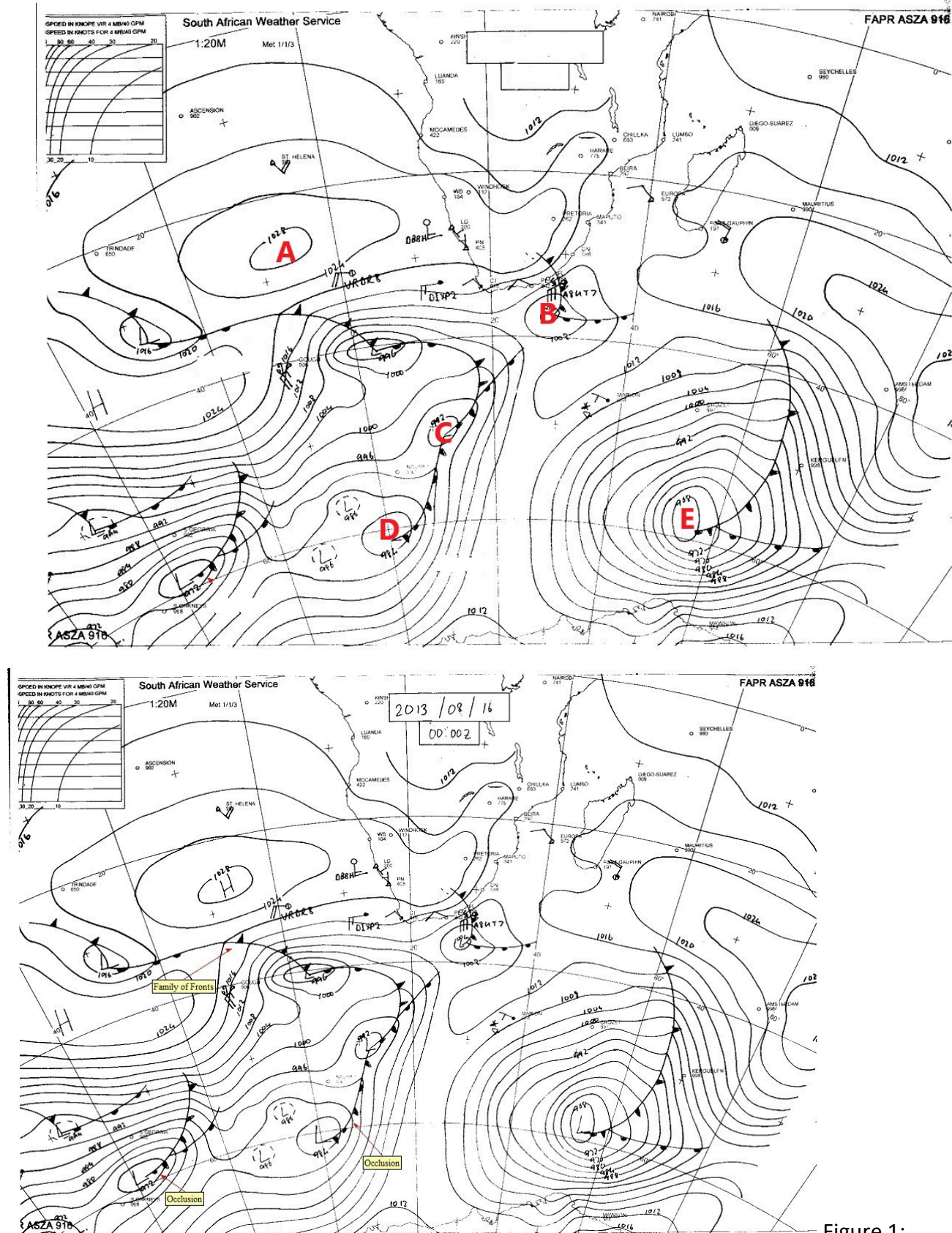


Figure 1:

Synoptic Chart of South Africa

With reference to Figure 1, answer the following questions:

1.4) Which season is represented in Figure 1? Give **TWO** reasons for your answer (3)

**Winter, high pressure over interior, MLC over the cape**

1.5) What pressure cells are indicated by the letters A, C, and D (3)

A) \_\_\_\_ H \_\_\_\_\_

C) \_\_\_\_ L \_\_\_\_\_

D) \_\_\_\_ L \_\_\_\_\_

1.6) At what stage of development is the phenomenon represented by the letter E currently at? (1)

\_\_\_\_ Occluded \_\_\_\_\_

[32]

## QUESTION 2 – ANSWER THESE QUESTIONS IN YOUR ANSWER BOOKLET

2.1) Compare the terms *Weather* and *Climate* (2)

**Weather is the short-term, day-to-day condition of the atmosphere.**

**Weather is a “snapshot” of atmospheric conditions.**

**Climate is the long-term average (e.g., over decades) of weather conditions and extremes in a region.**

2.2) Define the term *Wind shear* (1)

**is the variation of wind speed and direction with altitude**

2.3) What are *Supercells* (2)

**are the strongest thunderstorms causing damage through hailstorms and tornadoes**

**These can develop into mesocyclones**

2.4) What is a *squall line*? (2)

**Fast advancing cold front can cause violent lifting creating a squall line slightly ahead of the front creating high winds and intense storms.**

**Squall lines generally form along or ahead of cold fronts and can produce severe weather in the form of heavy rainfall, strong winds, large hail, and frequent lightning.**

2.5) What is an *air mass*? (4)

**An airmass is a distinctive body of air with a homogenous mix of temperature, humidity, and stability, and it initially reflects the characteristics of its source region**

2.6) What is a *Rain Shadow*?

(3)

**A rain shadow is a dry region of land on the side of a mountain range that is protected from the prevailing winds.**

**Prevailing winds carry air toward the mountain range. As the air rises up over a mountain range, the air cools, water vapor condenses, and clouds form. On this side of the mountains, called the windward side, precipitation falls in the form of rain or snow. The windward side of a mountain range is moist and lush because of this precipitation.**

2.7) What is a Storm surge and why are they dangerous?

(2)

**storm surge is experienced as a rapid rise of sea level near that portion of the eyewall associated with onshore winds, sometimes reaching a height of more than 6 metres and accompanied by very large wind-driven waves.**

**Much of the death toll in tropical cyclones is due to the storm surge.**

**The net result of the raised sea level, strong winds and torrential rains is to inflict severe damage on coastlines affected by the storm, especially those which are low-lying**

2.8) When and where do tornadoes occur in South Africa

(3)

**Typically occur in mid-summer from November to January, late afternoon or early evening, typically between 16:00 and 19:00.**

**Most have been observed in Gauteng, the Free State, KwaZulu-Natal (along a line from Pietermaritzburg to Ladysmith) and the northern region of the former Transkei**

2.9) Briefly explain what a *Berg Wind* is

(5)

**Berg winds are warm, dry, gusty winds that blow from the SA plateau toward the coast in winter.**

**• In winter, when there is a strong HP cell over the interior and a LP cell at the coast, wind spirals downwards and outwards around the HP.**

**• As the wind descends from the plateau to the coast, it is heated by compression, arriving at the coast as a hot, dry wind (sometimes over 35 °C) and can last for two or three days.**

2.10) Briefly describe the movement of a South African *Coastal Low* pressure

(4)

**Starting on the west coast, the spiral moves over a period of six to eight days around SA's coast as far as northern KZN, and then disappears.**

2.11) Briefly describe the process of hail formation

(4)

**Hail is created when small water droplets are caught in the updraft of a thunderstorm.**

**These water droplets are lifted higher and higher into the cloud until they freeze into ice.**

**As they get heavier, and due to gravity they will start to fall.**

**If the hailstones get caught in the updraft again, they will accumulate more water and get lifted again and freeze the new layer of water.**

**They get bigger and fall.**

**The cycle continues until the hailstone is too heavy and then falls to the ground.**

2.12) With reference to **Figure 1 Synoptic Chart of South Africa**, what phenomena are represented by the letters B and E, and briefly discuss the weather conditions associated with this type of weather system. (6)

### **MLC**

It is the large area of low pressure with a warm and cold front associated that is so common to our weather. A mid-latitude cyclone or wave cyclone is a vast low pressure system that migrates across a continent, pulling air masses into conflict along fronts.

can produce heavy rains and the circulation can last for many days as it moves over the Earth's surface

mid-latitude cyclones can include wintry precipitation such as snow, freezing rain and sleet.

weather tends to be cloudy or stormy at the centre of circulation of a mid-latitude cyclone.

They derive their energy from horizontal temperature changes, such as a cold front passing over an area.

[38]

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### **QUESTION 3 - ESSAY (No bullets, full sentences and paragraphs only)**

Discuss the development, characteristics and impacts of tropical cyclones in the Southern Hemisphere.

[20]

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**TOTAL [100]**

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