CLIMATOLOGY

Checklist

Make sure you:

- Are able to discuss and analyse Mid-latitude and Tropical Cyclones
- Understand Subtropical Anticyclones and the affect of the resultant weather over South Africa.
- Can discuss and apply concepts related to Valley and Urban Climates
- Are able to interpret synoptic weather maps and satellite images

Exam Questions

Question 1

Refer to FIGURE 1 and answer the following questions

1.1 Define the terms:
   a) Slope aspect. (1x1) (1)
   b) Temperature inversion. (1x1) (1)

1.2 Explain TWO reasons for the situation of settlement A. (2x2) (4)

1.3 During the night pollution is trapped in the lower part of the valley. Explain reasons for this occurrence. (2x2) (4)

1.4 Explain the formation of frost pockets at bottom of the valley. (2x2) (4)

TOTAL 14
Question 2
Refer to FIGURE 2 showing a synoptic weather map, and answer the questions below.

2.1 Name the pressure cell labelled A. (1x1) (1)
2.2 Explain the formation of pressure cell A. (1x2) (2)
2.3 Name the pressure system that is likely going to change the weather in Cape Town in the next few hours? (1x1) (1)
2.4 Describe THREE weather changes that Cape Town will experience. (3x2) (6)
2.5 Explain the origin of the cyclone labelled B. (1x2) (2)
2.6 What evidence indicates that cyclone B will move in a south-easterly direction? (1x2) (2)

TOTAL 14
Question 3
Examine FIGURE 3, which is based on destructive weather feature.

3.1 Name the weather feature labelled A. (1X1) (1)
3.2 Identify feature C. (1X1) (1)
3.3 State THREE weather conditions associated with C. (3X1) (3)
3.4 Explain why area C is associated with these weather conditions. (1X2) (2)
3.5 Give TWO reasons why these weather features are called destructive. (2x2) (4)
3.6 Is the system in the mature or formative stage? Give a reason for your answer. (1+2) (3)

TOTAL 14

Question 4
Examine the cartoon in FIGURE.4 on global warming.

4.1 Define the term global warming. (1x1) (1)
4.2 Comment on the argument between the developed nations (countries) and
Question 5
Study FIGURE 5 based on city climate.

5.1 Calculate the difference in temperature between the city centre and the farmland. (1x2) (2)
5.2 Give TWO reasons from the diagram why this temperature difference occurs. (2x2) (4)
5.3 Give the term used to describe the warm air over the city centre. (1x1) (1)
5.4 Explain why the shape of the pollution dome is not the same during the day and night. (2x2) (4)
5.5 Is the pollution dome over the city indicating a night time or daytime situation? Give a reason for your answer. (1+2) (3)

TOTAL 14
Question 6

Study the synoptic weather map/chart in FIGURE 6 and answer the questions that follow.

6.1 Name the type of low-pressure cell at B. (1x1) (1)
6.2 State the pressure at the centre of pressure cell A. (1x1) (1)
6.3 Identify TWO pieces of evidence from the synoptic map/chart to indicate that it represents winter conditions. (2x1) (2)
6.4 State the weather conditions at Durban. (4x1) (4)
6.5 Write a paragraph (approximately 12 lines) explaining why Durban is experiencing unusually high temperatures and what impact the weather conditions will have on the environment. (4x2) (8)

TOTAL 16

Question 7

FIGURE 7: ARTICLE AND SATELLITE IMAGE OF CYCLONE IRINA CYCLONE IRINA CAUSES CHAOS IN KZN

5 March
By Lungelo Mkamba, Kyle Venktess and Sapa

Hundreds of families have been left homeless and many roads and streets in Durban and other coastal areas north of the city right up to Kosi Bay were turned into raging rivers as tropical cyclone Irina caused chaos across the province. The weather services said that gale-force south-westerly winds (65 km/h) were expected on Monday. There was a warning of very rough seas with waves up to 6 m.

‘A combination of very rough seas, marine storm surge, as well as gale-force winds was likely to threaten the coastline,’ said police spokesperson Colonel Vishnu Naidoo. In Jozini in the Nyawushadi area a house collapsed on a woman, breaking her legs, after floods hit northern KwaZulu-Natal on Sunday morning.

Disaster teams were still quantifying the damage, but Naidoo estimated that at least 300 houses had been flooded.
7.1 How many cyclones, including Irina, have occurred so far in this tropical cyclone season? (1x1) (1)

7.2 What evidence on the satellite image suggests that Irina is a tropical cyclone? (1x1) (1)

7.3 State TWO conditions necessary for the formation of tropical cyclones. (2x1) (2)

7.4 Explain why people in KwaZulu-Natal would not have been prepared for the chaos created by tropical cyclone Irina (2x2) (4)

7.5 Write a paragraph explaining the impact that the flooding caused by Irina would have on the economy and environment of KwaZulu-Natal. (4x2) (8)

TOTAL 16

Question 8
Refer to the cartoon based on climate change in FIGURE 8

8.1 Define the term climate change. (1x1) (1)
8.2 Explain evidence from the cartoon that indicates that not all people are serious about climate change. (1x2) (2)

8.3 State THREE ways in which humans have contributed to climate change. (3x1) (3)

8.4 One of the results of climate change is the increase in temperature. State TWO negative impacts that an increase in temperature will have on humans. (2x1) (2)

8.5 Write a single paragraph proposing and explaining TWO sustainable methods that can be used to prevent climate change. (4x2) (8)

TOTAL 16

Test Yourself

Question 1

Refer to FIGURE 1, showing a mid-latitude cyclone, to answer the questions that follow. Various options are given as possible answers. Choose the answer and write only the letter (A–D) next to the question number.

FIGURE 1

1.1 Mid latitude cyclones are also known as …
A. frontal depressions.
B. moisture fronts.
C. depressions.
D. anticyclones

1.2 Mid latitude cyclones move from … in the southern hemisphere
A. east to west
B. southeast to northwest
C. south to north
D. west to east

1.3 Mid latitude cyclones occur between the …
A. latitudes 0º and 30º.
B. latitudes 30º and 60º.
C. longitudes 30º and 60º..
D. latitudes 60º and 90º..
1.4 A series of mid latitudes cyclones are known as a ...
A. group of mid latitudes.
B. cluster of mid latitudes.
C. family of mid latitudes.
D. variety of mid latitudes.

1.5 The diameter of mid latitude cyclones range from ...
A. 100 to 400 km
B. 500 to 1000 km
C. 10000 to 14000 km
D. 1000 to 4000 km

1.6 In the warm front occlusion the temperature ahead of the warm front is ...
A. lower than the air behind the cold front.
B. higher than the air behind the cold front.
C. is the same as the air behind the cold front.
D. lower or higher than the air behind the cold front.

1.7 Mid-latitude cyclones mainly effect South Africa in winter because the ...
A. a) South Atlantic Anticyclone and South Indian Anticyclone are in their southerly position.
B. b) South Atlantic Anticyclone and South Indian Anticyclone are in their northerly position.
C. c) South Atlantic Anticyclone and South Indian Anticyclone are weakly developed.
D. d) South Atlantic Anticyclone and South Indian Anticyclone dissipate.

1.8 Mid latitude cyclones form in the … wind belt.
A. polar easterly
B. tropical easterly
C. westerly
D. tropical (8x1) (8)
**Question 2**

Choose a term from COLUMN B that matches the description in COLUMN A. Write only the letter (A–I) next to the question number (2.1–2.5). You may use each answer only ONCE.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Immature stage</td>
<td>A. Air pressure below 960 hPa and torrential rainfall</td>
</tr>
<tr>
<td>2.2 Category 5 Tropical</td>
<td>B. Air pressure above 1000 hPa and light rainfall</td>
</tr>
<tr>
<td>cyclone</td>
<td></td>
</tr>
<tr>
<td>2.3 Formative stage</td>
<td>C. Wind speeds over 280km/h</td>
</tr>
<tr>
<td>2.4 Dissipating stage</td>
<td>D. Air pressure decreases to below 1000 hPa and light rainfall</td>
</tr>
<tr>
<td>2.5 Mature stage</td>
<td>E. Air pressure increases and rainfall continues</td>
</tr>
<tr>
<td>2.6 Tropical depression</td>
<td>F. Calm and clear conditions</td>
</tr>
<tr>
<td>2.7 Tropical storm</td>
<td>G. A system of thunderstorms and clouds with wind speeds less than 61km/h</td>
</tr>
<tr>
<td>2.8 Eye</td>
<td>H. As system of heavy thunderstorms with wind speeds between 61 to 117km/h</td>
</tr>
</tbody>
</table>

**Question 3**

Refer to FIGURE 3, showing air movement in a valley. Choose the correct answer from the alternatives provided.

The movement of air in the diagram is known as 3.1 (anabatic/katabatic) wind. This wind occurs during the 3.2 (night/day). Here air moves 3.3 (upslope/downslope). 3.4 (Sublimation/Condensation) causes frost pockets on the floor of the valley. This air movement causes 3.5 (evaporation/temperature inversion) in the valley. The zone marked X is the warm 3.6 (thermal belt/heat belt). The heat loss in the valley is as a result of 3.7 (terrestrial radiation/insolation).

(7 x 1) (7)
Question 4
Refer to FIGURE 4, showing Berg wind conditions. Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only ‘true’ or ‘false’ next to the question number.

4.1 The Berg wind is a warm moist wind.
4.2 The high pressure over the land is weakly developed.
4.3 For Berg winds to occur there must be an interior high pressure system and a thermal low pressure system.
4.4 Moist air moves from the interior and heats up adiabatically as it flows down the escarpment.
4.5 The low pressure system along the coast can occur during winter and summer.
4.6 The low pressure system along the coast can cause humid or dry conditions.
4.7 Berg wind are occasionally experienced in summer.
4.8 Berg winds are responsible for veld fires.

Question 5
Study FIGURE 5, which is based on high- and low-pressure cells. Complete the following statements by using the words given in the list below. Write only the word(s) next to the question number (5.1–5.7).
Northern Hemisphere; pressure; convergence; diverge; clockwise; Southern Hemisphere, anticlockwise, high; low

5.1 The hemisphere in which the above pressure cells are found is the ...
5.2 The ... pressure system generally associated with clear sunny skies.
5.3 The ... pressure system generally associated with precipitation.
5.4 The air around the low pressure system circulates in a ... direction
5.5 The air around the high pressure system circulates in a ... direction
5.6 The high pressure system causes the air to ...
5.7 The low pressure system causes the air to ...  (7x1) (7)