SENIOR SECONDARY IMPROVEMENT PROGRAMME 2013

education
Department: Education
GAUTENG PROVINCE

GRADE 12

GEOGRAPHY

LEARNER NOTES

The SSIP is supported by

TABLE OF CONTENTS

LEARNER NOTES

SESSION	TOPIC	PAGE
8	1. Geomorphology consolidation	3
9	1. Climatology, Geomorphology and Mapwork - consolidation exercises	15
10	Climatology, Geomorphology and GIS: Consolidation Exercises	33
11	Climatology, Geomorphology and Mapwork: Consolidation Exercises	47

SESSION 8

TOPIC: GEOMORPHOLOGY CONSOLIDATION

Learner Note: In the prelim and final papers the geomorphology section is equally mixed with climatology in the first two questions in Section A. You really need to know your work well to get good marks for section A in the final exam. You must also be able to apply your knowledge as there are some interpretation questions where you also need to understand the processes involved in geomorphology and climatology. You must put in a lot of effort to get to know this part of the work well. You must know the facts as you will not get marks for vague answers.

SECTION A: TYPICAL EXAM QUESTIONS

QUESTION 1: 30 minutes 50 marks *(Source: Focus exam bank adapted.)*

1.1 Various possible answers are provided for each question. Write the **letter only** of the correct answer next to the corresponding number.

1.1.1 A watershed is …

A a large amount of rainwater flowing over the surface as overland flow or sheetflow.

B the upper level of the zone of groundwater saturation in permeable rocks.

C the high ground separating one drainage basin from another.

D a pass or valley through a mountain that is followed by a river

1.1.2 A trellis drainage pattern develops on …

A rocks of uniform or homogeneous resistance and in an area of uniform gradient.

B inclined strata which are unequally resistant to erosion or in areas where there are parallel fold mountains.

C igneous rocks that have joints and cracks indicating lines of weakness.

D domes where streams flow outwards and downhill.

1.1.3 A hydrograph for an urban area has a shorter lag time and higher flood peak because,

A there is more run off and less infiltration in urban areas.

B there is less run off and more infiltration in urban areas.

C drainage basins in urban areas are usually pear shaped.

D there are higher stream orders in urban areas.

1.1.4 River capture can be caused by …

A a knickpoint on a concave river profile.

B a windgap that rejuvenates river flow.

C river terraces that join at the elbow of capture.

D increased headward erosion due to steeper gradient and/or larger volume.

1.1.5 A river has a graded profile when …

A laminar flow causes erosion.
B turbulent flow causes rapids and waterfalls.
C equilibrium has been achieved due to a balance between erosion, transportation and deposition.
D erosion is greater than deposition because of rejuvenation. (5 x 2) (10)

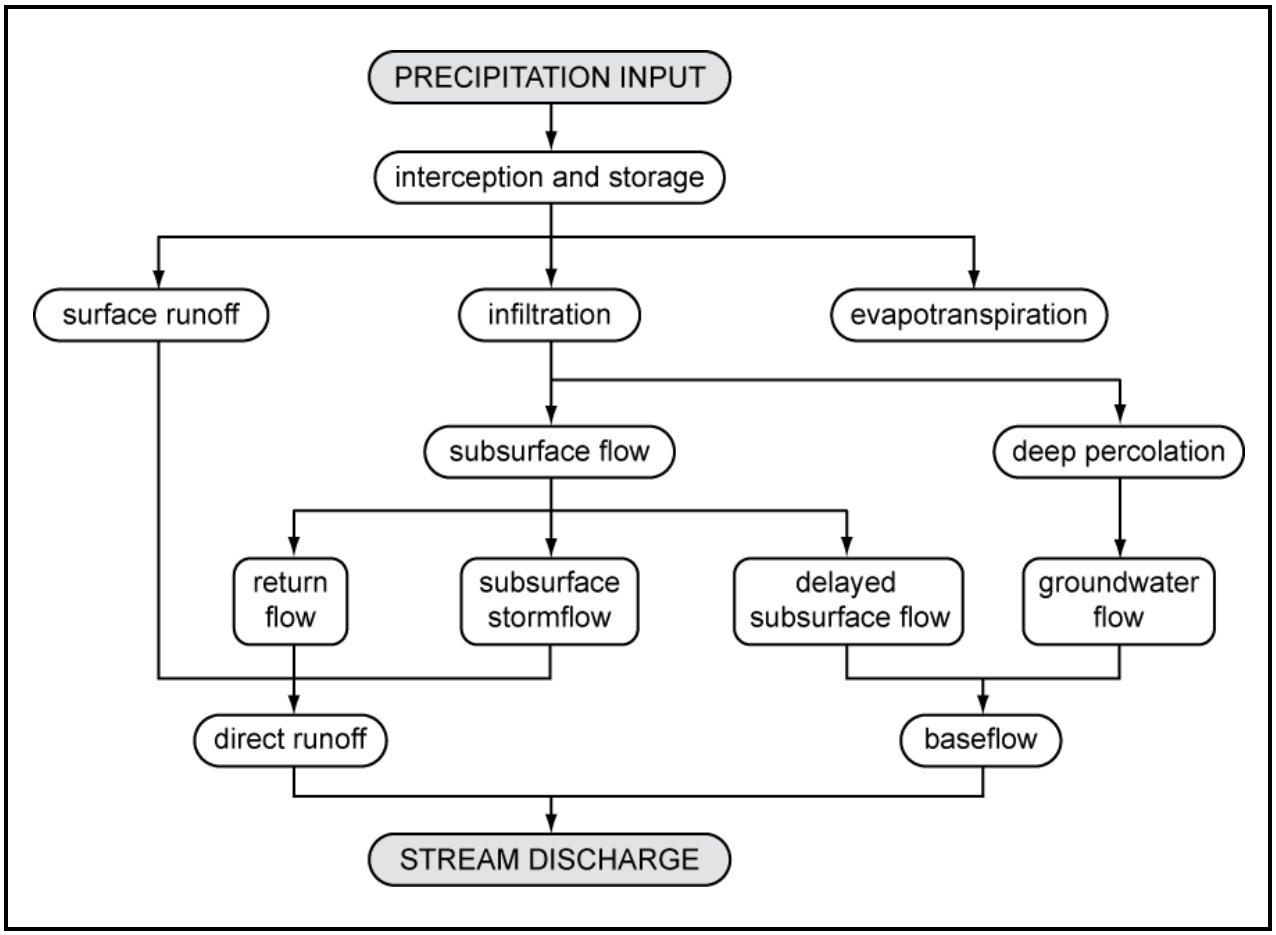
1.2 Carefully study the following flow chart model of fluvial runoff which follows:

1.2.1 Define these fluvial terms:

a) Infiltration
b) Stream discharge
c) Baseflow (3 x 2)(6)

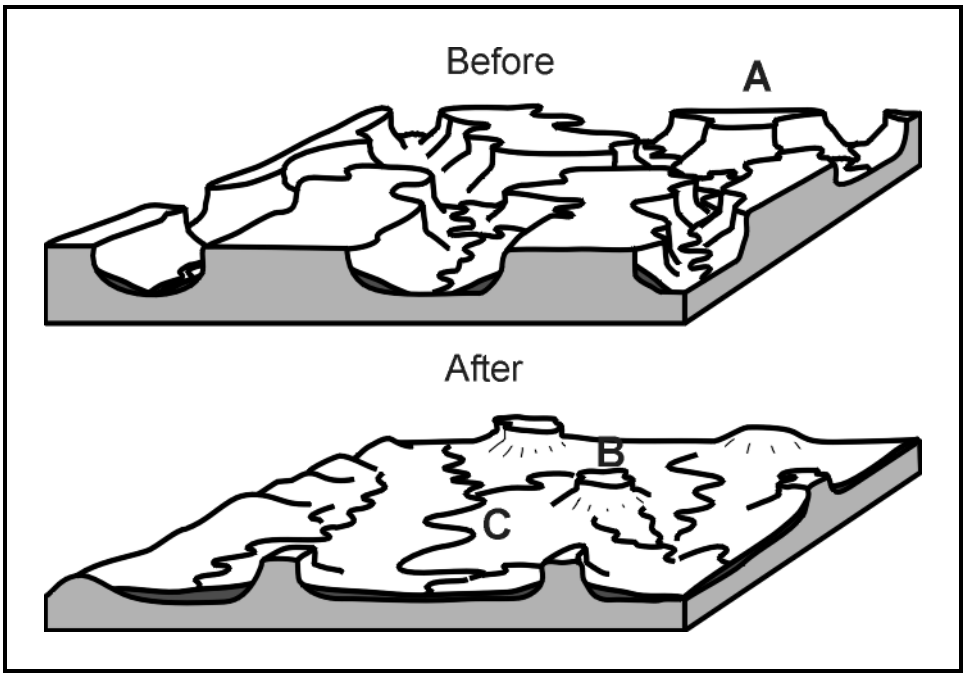
1.2.2 Explain how widespread soil erosion in the catchment area of this river system would influence surface runoff. (2 x 2)(4)

1.2.3 During drought periods with water restrictions, many residents sink boreholes to obtain water. Predict the long-term impact of boreholes on baseflow and ultimately stream discharge. (2 x 2) (4)



Source: Adapted from: Knighton, David. 1998 *Fluvial Forms and Processes* .Arnold Publishers.

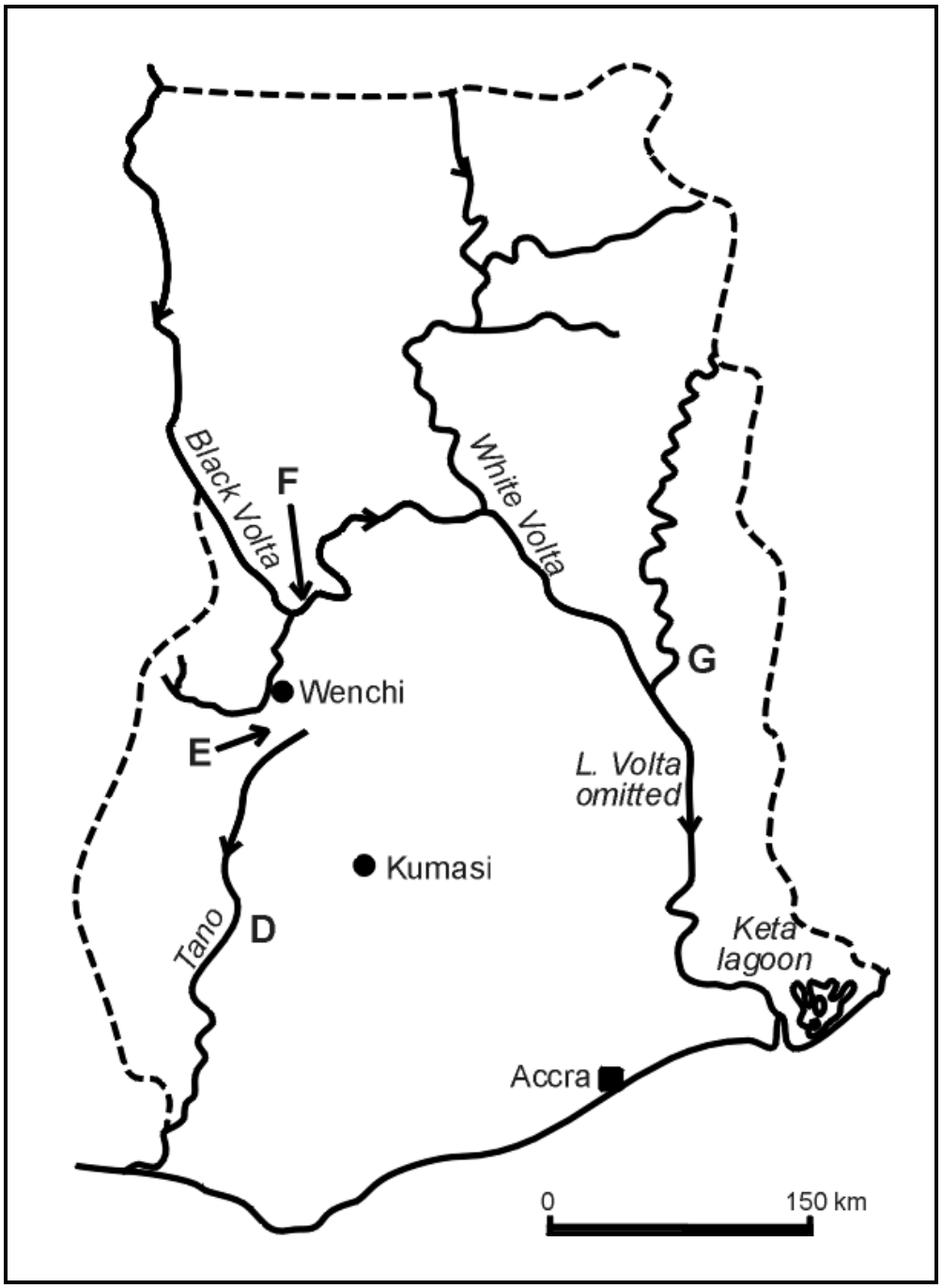
Carefully study the following diagram showing 'before' and 'after' models of landscape development before answering the questions below.



1.2.4 Identify landforms labelled A, B and C. (3 x 1) (3)

1.2.5 Use the diagram as a guide and discuss how this landscape developed. (4 x 2) (8)

1.2.6 Study the diagram on the following page that shows river capture of the Tano River by the Volta River in Ghana. The point of capture was north of Wenchi. Answer the questions that follow:



1.2.6 Identify the components of river capture labelled D, E, F and G. (4 x 2) (8)

1.2.7 List **THREE** factors that could have lead to the Volta River 'capturing' the waters of the Tano River. (3 x 2) (6)

1.2.8 Which of the two rivers (Volta or Tano) would have the greater discharge as they flow into the sea? (1)

[50]

HINTS: Remember that the sketches are very important. You must be able to apply work you have done in class to a new sketch or map. Read the introductory paragraphs to questions carefully – they often contain some direction to what is expected in the answers.

QUESTION 2: 64 minutes 63 marks *(Source: combination of different text books and past papers.)*

2.1. The following statements are all related to physical geography. Indicate whether the following statements are TRUE of FALSE. Write only 'true' or 'false' next to the question numbers.

2.1.1. The misfit river is the river that loses water after river capture/piracy has occurred. (1 x 2) (2)

2.1.2. A waterfall may develop at the elbow of capture after river capture/piracy has occurred. (1 x 2) (2)

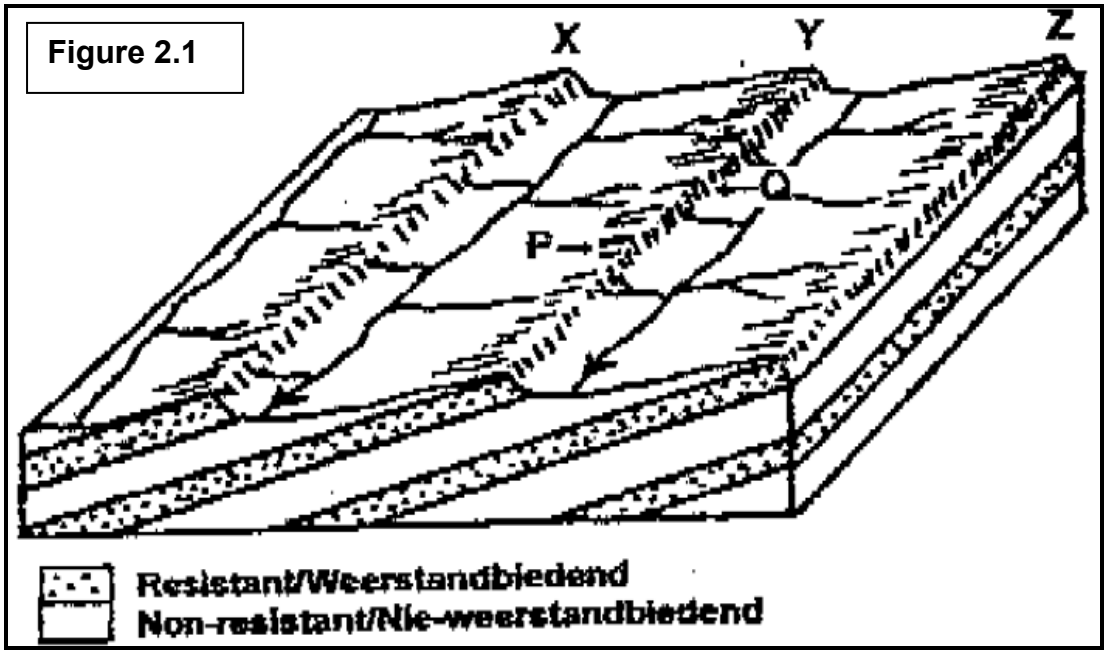
2.1.3. In between parallel lying, homoclinal ridges a trellis drainage pattern is most likely to develop. (1 x 2) (2)

2.1.4. The tributaries of the main stream in a dendritic drainage pattern are all short. (1 x 2) (2)

2.1.5. A watershed separates drainage basins. (1 x 2) (2)

2.2. North-east of Port Elizabeth one finds the settlement of Seymore that is surrounded by a landscape similar to the one illustrated in Figure 2.1 below.

Figure 2.1



2.2.1. Is the landscape illustrated in figure 2.1 associated with inclined or horizontal strata? (1)

2.2.2. Identify landform Y. (1)

2.2.3. Identify slopes P and Q associated with landform Y. (2 x 2) (4)

2.2.4. Explain how the underlying rock structure resulted in the development of landform Y. (3 x 2) (6)

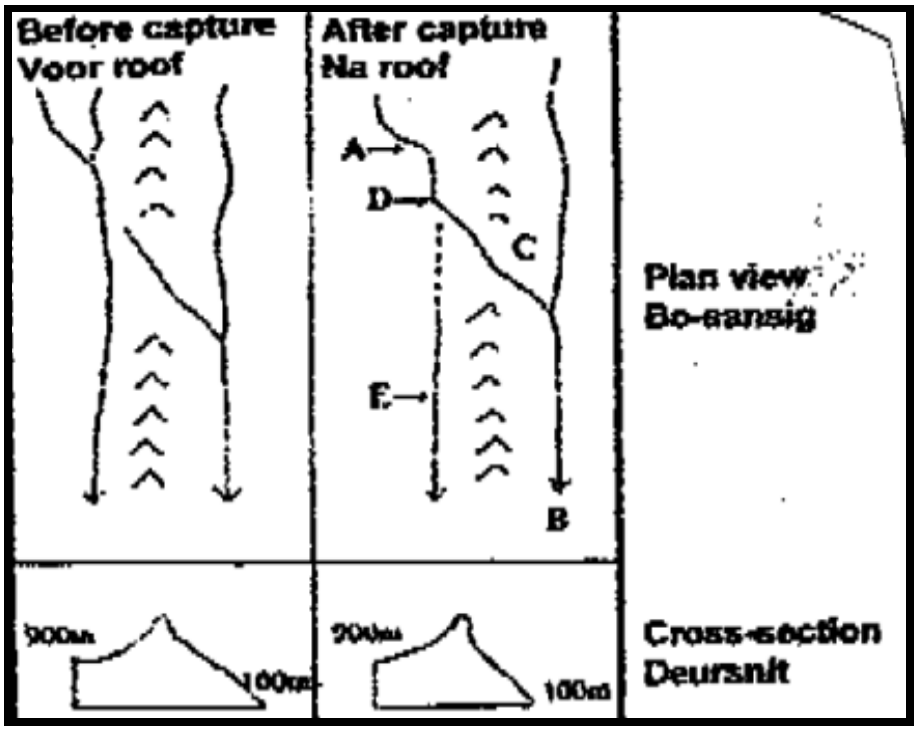
2.2.5. a) Which slope, P or Q, is more suitable for human settlement? (1 x 2) (2)

b) Give one reason for your answer in Question 2.2.5.(a) (1 x 2) (2)

2.2.6. Explain why the landscape illustrated in Figure 2.1. is suitable for agricultural activities. (2 x 2) (4)

2.3. The nature of the landscape illustrated in Figure 2.1 lends itself to the process of river capture/piracy. Figure 2.2 below shows a landscape before and after river capture/piracy.

Figure 2.2



2.3.1. Identify the features of river capture/piracy labelled A, B, D and E. (2 x 2) (4)

2.3.2. Explain the process of river capture/piracy with reference to Figure 2.2. (3 x 2) (6)

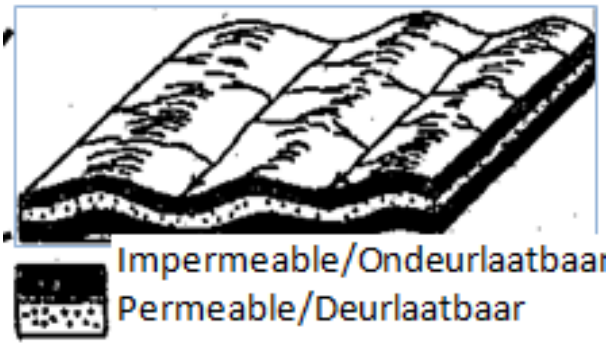
2.3.3. Explain why flooding will occur more often in river B after river capture/piracy has taken place. (2 x 2) (4)

2.3.4. Indicate how river capture/piracy will change the ability of river B to erode the landscape. (1 x 2) (2)

2.4. Surrounding the South-Western Cape to the north and east are the parallel lying Cape Fold Mountains. These mountain ranges develop a typical drainage pattern with their own unique microclimate.

2.4.1 Refer to Figure 1.1A on the following page showing the drainage pattern in the Cape Fold Mountains.

Figure 1.1 A



a) Identify the drainage pattern illustrated in Figure 1.1A. (1)
b) Give ONE reason for your answer in Question 2.5.1.(a) (1 x 2) (2)
c) Explain why this drainage pattern is characteristic of the Cape Fold Mountains. (2 x 2) (4)
d) Excluding a trellis and dendritic drainage pattern, name any other pattern that you have studied. (1 x 2) (2)
e) Explain why a high run-off and low infiltration will occur in the illustrated landscape. (2 x 2) (4)
f) Name and describe any other factors that will result in a high run-off and low infiltration. (2 x 2) (4)
[63]

SECTION B: ADDITIONAL CONTENT NOTES

No additional notes

SECTION C: HOMEWORK

QUESTION 1: 30 minutes 40 marks *(Source: SBA 2010)*

The hydrograph on the next page depicts the Tugela River during a storm. Refer to the hydrograph to answer the questions below.

1.1. Define the following terms:
(a) Discharge (1 x 2) (2)
(b) A flood (1 x 2) (2)
(c) Flood Peak (1 x 2) (2)
(d) Hydrograph (1 x 2) (2)
(e) Velocity (1 x 2) (2)

1.2 Provide labels for A, B, D and E respectively. (4 x 2) (8)
(Choose from the following: Lag time/Rising limb/Peak discharge/Base flow)

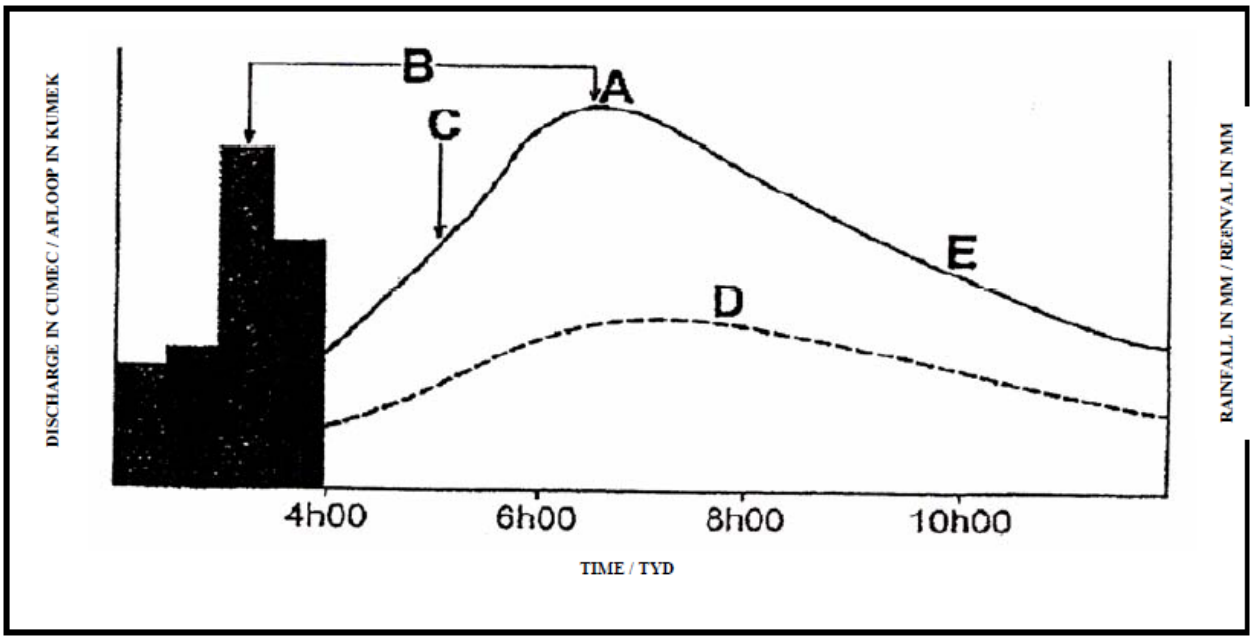
1.3 Describe the relationship between discharge and rainfall illustrated in the flow hydrograph. (2 x 2) (4)

1.4 List THREE factors that will affect the velocity (speed) of a river. (3 x 2) (6)

1.5 Predict what would happen to the volume of water in the river after a storm has stopped. (1 x 2) (2)

1.6 When the lag time is long and the peak flow is low, on a hydrograph, this indicates high infiltration. Discuss the factors that result in high infiltration in a short paragraph (12 lines). (5 x 2) (10)

[40]



QUESTION 2: 30 minutes 50 marks *(Source: Focus Exam bank)*

2.1 Various possible answers are provided for each question. Write the **letter only** of the correct answer next to the corresponding number.

2.1.1 Which factor will **not** affect the balance between erosion and deposition in a river with a graded profile?

A A change in stream load
B A change in climate
C River capture
D A drop in sea level

2.1.2 The main factors determining to which extent a river is able to deepen its course is:

(i) Gradient
(ii) Flow
(iii) Load
(iv) Stream channel characteristics

Select the correct option.

A (i) and (ii)
B (iii) and (iv)
C (i) and (iv)
D (i), (ii), (iii) and (iv)

2.1.3 An antecedent river valley …

A is older than the geological structure through which it carves its route.
B has a superimposed drainage system.
C had to carve into the underlying structure because the river valley was too deeply carved.
D stretches across a resistant rock layer which is older than the river valley itself.

2.1.4 Features that can form as a result of rejuvenation are …

(i) incised meanders.
(ii) valleys within valleys.
(iii) knickpoint waterfall.
(iv) river terraces.

Select the correct combination

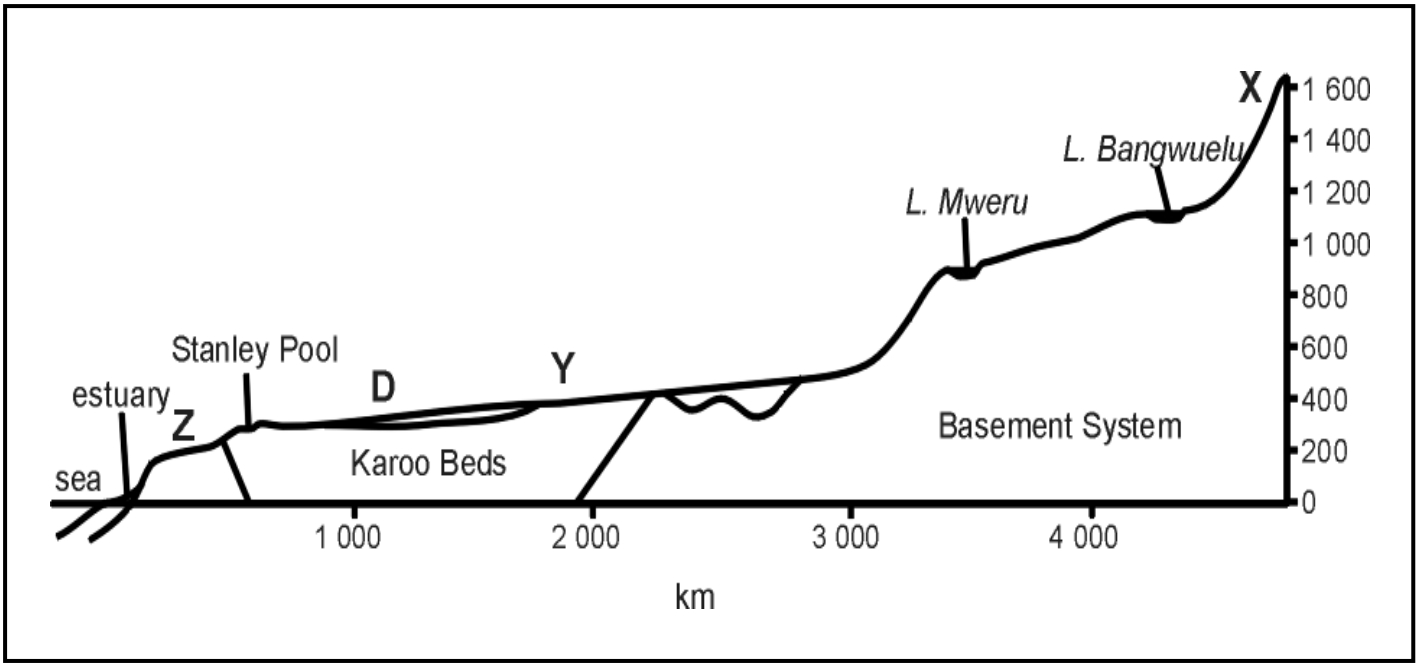
A (i), (ii) and (iv)
B (ii), (iii) and (iv)
C (i), (ii) (iii) and (iv)
D (i), (ii) and (iii)

2.1.5.The most dominant process in the youth stage of a river is:

A Deposition
B Downward erosion
C Lateral erosion
D Weathering

(5 x 2) [10]

2.2 Study the following longitudinal river profile along the Congo River in Africa.



2.2.1 Copy the river profile onto your answer book and on it indicate:

a) One temporary base level (1 x 2) (2)

b) One knick point (1 x 2) (2)

c) Permanent base level (1 x 2) (2)

2.2.2 Copy and complete the following table to compare the characteristics of the Congo River at point X and Y:

Fluvial characteristics	**Point X**	**Point Y**
Stream width		
Stream load		
Stream volume		
Stream velocity		
Type of stream flow		

(10 x 1) (10)

2.2.3 Does the longitudinal river profile of the Congo River show a graded river profile? Support your answer with evidence from the longitudinal river profile. (3 x 2) (6)

2.2.4 River braiding occurs at point Z. Using an annotated sketch (drawing with labels), demonstrate how such features form. (4 x 2)(8)

2.2.5 A dam is being constructed across the Congo River at point D. Write a report for the Minister of Water Affairs in which you:

Outline the fluvial changes in the river both upstream and downstream of the dam wall, **and** list the benefits of the dam. (5 x 2)(10)

[50]

SECTION D: SOLUTIONS AND HINTS TO SECTION A

QUESTION 1

1.1.1 C ✓✓ (2)

1.1.2 B ✓✓ (2)

1.1.3 A ✓✓ (2)

1.1.4 D ✓✓ (2)

1.1.5 C ✓✓ (2)

[10]

1.2.1 a) Infiltration: movement of water through soil into the ground ✓✓

b) Stream discharge: quantity of water flowing in a river ✓✓

c) Baseflow: the flow of water entering stream channels from groundwater ✓✓

(3 x 2) (6)

1.2.2 Widespread soil erosion would increase surface runoff; ✓✓ there would be less vegetation (which aids infiltration) and ground would be bare favoring runoff (which in turn would increase soil erosion). ✓✓There would also be more silt in the runoff. ✓✓ (2 x 2) (4)

1.2.3 Bore holes pump water up from underground. If this removal of water increased, there would be less baseflow ✓✓ and ultimately less stream discharge. ✓✓ (2 x 2) (4)

1.2.4 A: mesa ✓
B: butte ✓
C: pediplain; plain; pediment ✓ (3 x 1) (3)

1.2.5 This landscape is an example of a landscape influenced by horizontal rock strata. ✓✓

Horizontal layers of resistant cap rock (e.g. dolerite, quartzite, basalt) protected the softer layers below (e.g. sandstone); ✓✓

These rock layers also caused landforms (e.g. mesas, buttes) to have flat tops. ✓✓

The landscape evolved over millions of years by rivers wearing the landscape down (and back). ✓✓

Eventually the landscape will be eroded away with perhaps only a few small remnants remaining. ✓✓ (4 x 2) (8)

1.2.6 D: beheaded river, misfit stream ✓✓
E: wind gap/river gravels/dry gap ✓✓
F: elbow of capture ✓✓
G: capturing river, pirate stream, captor ✓✓ (4 x 2) (8)

1.2.7 Any three of the following:

Softer/ less resistant rock, ✓✓
Geological weakness (e.g. crack, joint, fault), ✓✓
Increased precipitation, ✓✓
Increased discharge, ✓✓
Increased gradient, ✓✓
Rejuvenation ✓✓ (3 x 2) (6)

1.2.8 Volta ✓ (1)

[40]

[50]

QUESTION 2

2.1.1 True ✓✓
2.1.2. True ✓✓
2.1.3. True ✓✓
2.1.4. False ✓✓
2.1.5. True ✓✓ (5 x 2) (10)

2.2.1. Inclined ✓ (1)
2.2.2. Homoclinal ridge ✓ (1)
2.2.3. P – Dip slope ✓✓
Q – Scarp slope ✓✓ (2 x 2) (4)

2.2.4. Inclined sedimentary rock ✓✓
With hard and soft rock which is exposed to the surface, ✓✓
The soft rock is eroded and the hard rock remains as a low ridge called a dip slope, ✓✓
The steeper slope is called the scarp slope. ✓✓ (3 x 2) (6)

2.2.5. a) P✓✓ (2)
b) P is more gradual ✓✓ (2)

2.2.6. Vineyards and agriculture on the gentle slopes/ ✓✓
Contour ploughing/ ✓✓
Steep slopes forests. ✓✓ (2 x 2) (4)

2.3.1. A – captive / captured river / Pirated stream✓
B – Captor river / Pirate stream✓
D – Elbow of capture ✓
E – Misfit river ✓ (4)

2.3.2. The energetic fist order stream erodes back into the mountain, ✓✓
It may be weaker rock / more rain / more water in river ✓✓
Headward erosion cuts through watershed, ✓✓
Stream lengthens itself and catching hold of the older river on a higher slope. ✓✓ (3 x 2) (6)

2.3.3. It has more water in it, ✓✓
Increased its hydrological drainage basin ✓✓ (2 x 2) (4)

2.3.4. It will increase as there is more water in it / increased volume. ✓✓ (1 x 2) (2)

2.4.1. a) Trellis ✓ (1)

b) Parallel streams with short tributaries ✓✓ (1 x 2) (2)

c) Formed in sedimentary rocks with band of resistant and weak rocks. ✓✓
Main river forms in valleys, short tributaries join from the mountains. ✓✓ (2 x 2) (4)

d) Rectangular, angular, deranged, radial, barbed etc. ✓✓ (1 x 2) (2)

e) Impermeable rock ✓✓ at the surface does not allow water to infiltrate ✓✓ and, therefore, increases the runoff. ✓✓ (2 x 3) (6)

f) Sparse vegetation✓– infiltration does not take place etc ✓
Steep slopes ✓ - water runs down to fast to allow for infiltration ✓
Saturated soils ✓ - water cannot infiltrate wet soil ✓
[Any ONE with reason] (1 x 2) (2)

[61]

SESSION 10

TOPIC: CLIMATOLOGY, GEOMORPHOLOGY AND MAPWORK CONSOLIDATION EXERCISES

SECTION A: TYPICAL EXAM QUESTIONS

QUESTION 1: 30 minutes 50 marks *(Various class notes and past papers)*

1.1 Various possible answers are provided for each question. Write the **letter only** of the correct answer next to the corresponding number .

1.1.1 The movement of air towards a low pressure is called:

A Divergence
B Adiabatic
C Anabatic
D Convergence

1.1.2 The atmospheric cell found on either side of the equator is the:

A Ferrel Cell
B Mid-latitude Cell
C Tropical cyclone
D Hadley Cell

1.1.3 The ITCZ is the convergence of:

A Polar Easterlies
B Westerlies
C Tropical Westerlies
D Tropical Easterlies

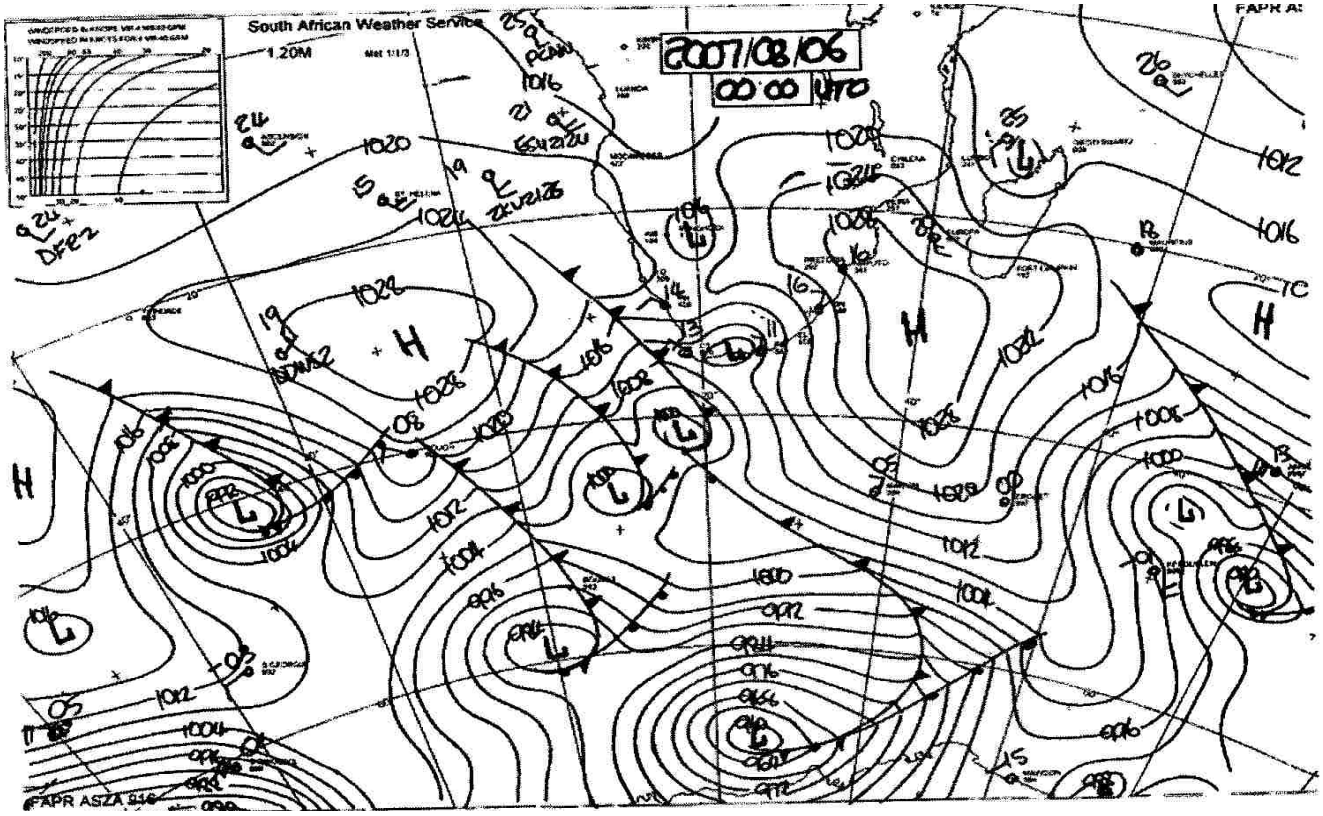
1.1.4 Winds that converge at the polar front are:

A Westerlies and tropical easterlies
B Polar easterlies and westerlies
C Polar westerlies
D Polar easterlies and tropical westerlies

1.1.5 The anticlockwise change in direction of wind with the passing of a mid-latitude cyclone over Cape Town is called:

A Backing
B Veering
C Converging
D Rotating (5 x 2) (10)

1.2 Study the accompanying synoptic weather map and answer the questions that follow:



1.2.1 Suggest the season giving two reasons for your answer. (3 x 2) (6)

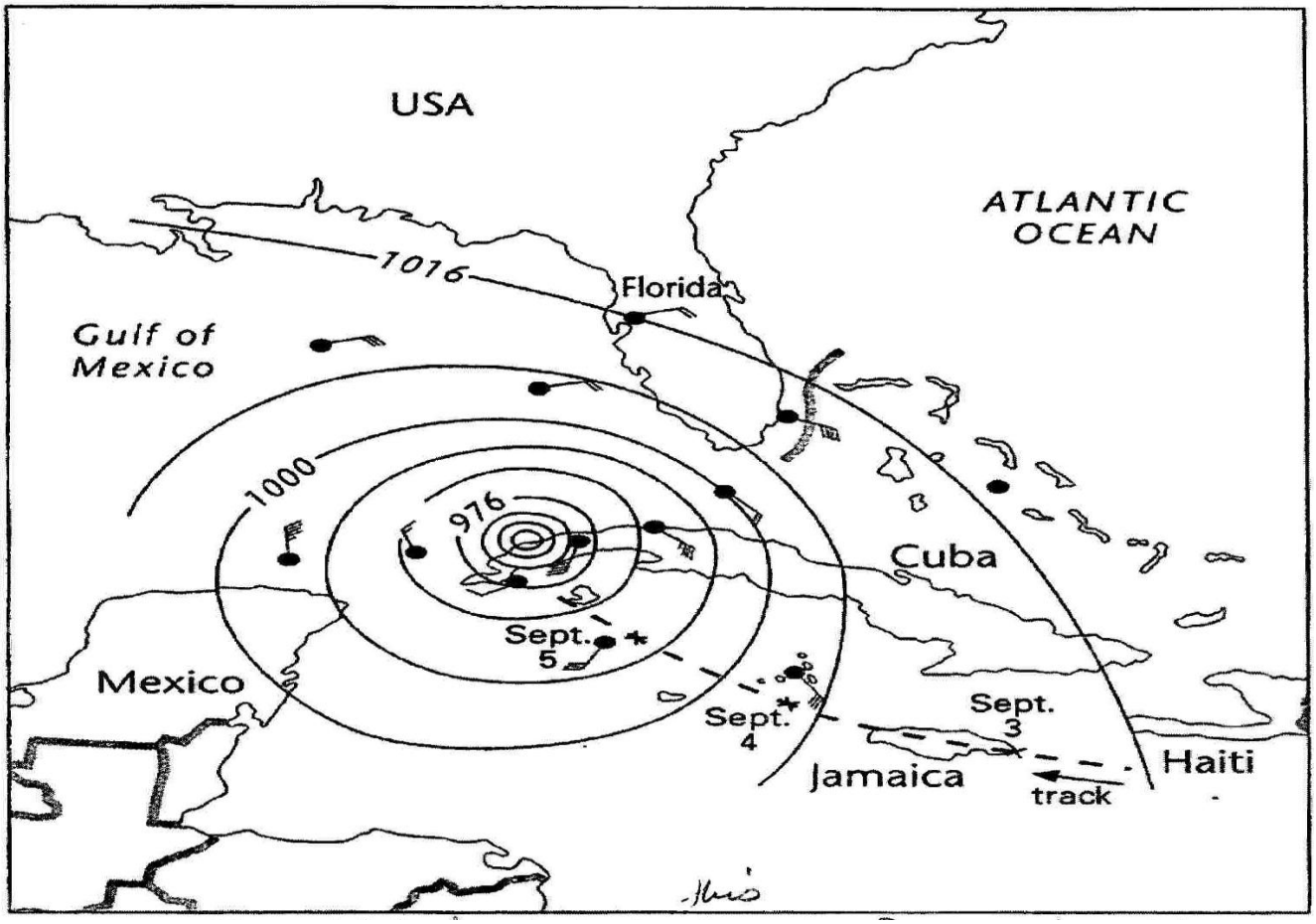
1.2.2 Estimate the pressure over Cape Town. (1 x 2) (2)

1.2.3 Describe the wind over Cape Town and give a full account or explanation. (4 x 2) (8)

1.2.4 How will the weather over Cape Town change in the next 12 hours? (3 x 2) (6)

1.2.5 To the west of South Africa are a series of cold fronts. What do we call a series of frontal depressions? (1 x 2) (2)

1.3 The following diagram shows the passage of a hurricane in the Carribean Sea.



1.3.1 In which hemisphere can this hurricane be found? (1 x 2) (2)

1.3.2 What is the difference between a tropical storm and a tropical cyclone? (1 x 2) (2)

1.3.3 Describe and account for the path taken by the hurricane. (4 x 2) (8)

1.3.4 Predict, giving reasons, the course the hurricane will probably take over the next few days. (2 x 2) (4)

[50]

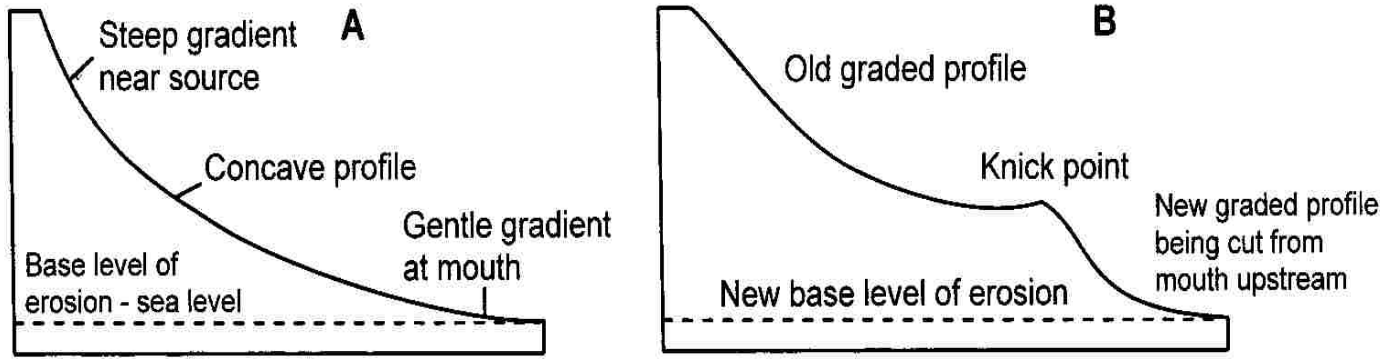
QUESTION 2: 40 minutes 50 marks *(Various class notes and past papers)*

2.1 Choose a description from COLUMN B that matches an item in COLUMN A. Write only the letter (A-L) next to the question number (2.1.1 – 2.1.5).

COLUMN A	COLUMN B
2.1.1 Abstraction	A the cold front merges with the warm front and the warm sector is lifted off the ground
2.1.2 Captured river	B the erosion of a slope at a constant angle
2.1.3 Scarp retreat	C air that moves up a slope during the day
2.1.4 Soil creep	D the very slow downward movement of soil under the influence of gravity
2.1.5 Base level of erosion	E the lowest level to which a river will erode
	F the lengthening of a river course by the river cutting backwards towards its source
	G the inward horizontal flow of air towards its source
	H the tendency of air moving across the rotating surface of the earth to be deflected
	I warm, dry winds that flow down the escarpment
	J a river that is diverted and loses water
	K a watershed is cut back and lowered by highly erosive rivers
	L air that is warmer than its environment will continue to rise

(5 x 2) (10)

2.2 Figure A below shows the longitudinal profile of a stream before rejuvenation has taken place. Figure B shows the longitudinal profile of the same stream after rejuvenation has taken place.



2.2.1. The longitudinal profile illustrated in Figure A is that of a graded stream. What is meant by a *graded stream?* (1 x 2) (2)

2.2.2 With reference to figure A, give ONE piece of evidence to support the Statement that the longitudinal profile of a graded stream is being illustrated. (1 x 2) (2)

2.2.3 Explain why a graded stream develops a concave longitudinal profile. (2 x 2) (4)

2.2.4 What is meant by the term *rejuvenation*? (1 x 2) (2)

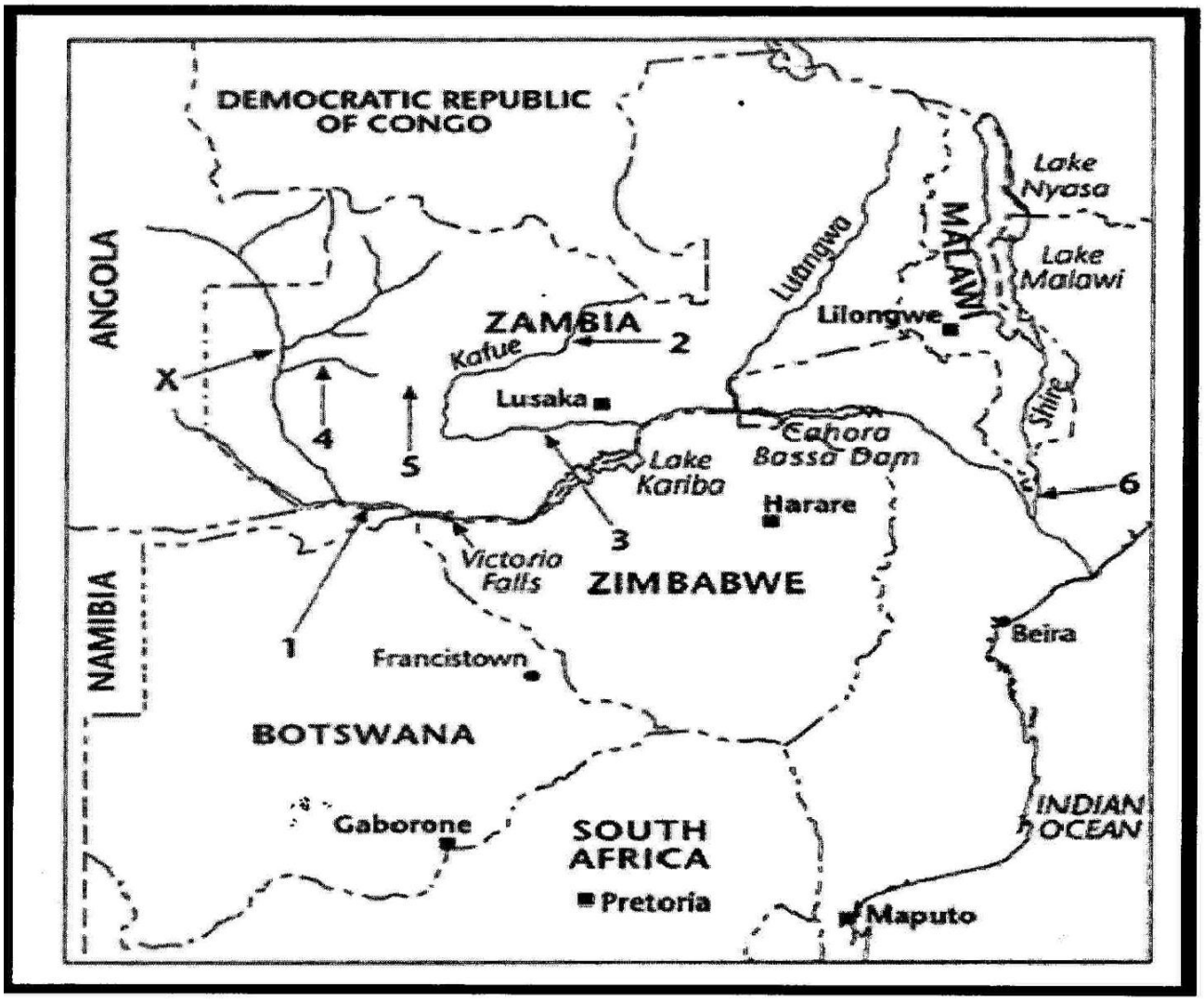
2.2.5 What feature in figure B indicates that rejuvenation has taken place? (1 x 2) (2)

2.2.6 Give TWO reasons why a stream can rejuvenate itself. (2 x 2) (4)

2.2.7 Is the knick point waterfall shown in figure B an example of a permanent or a temporary base level of erosion? (1 x 2) (2)

2.2.8 Give a reason for your answer to Question 2.2.7. (1 x 2) (2)

2.3 Study the following sketch map of the Zambezi River Basin. Answer all the questions that follow.



2.3.1 What is the probable underlying geology of this area? (1 x 2) (2)
2.3.2 Name TWO different types of temporary base levels found on this map. (2 x 2) (4)
2.3.3 Draw labelled sketch cross profiles to contrast the shape of the valley:
(a) Upstream of the Victoria Falls (1 x 2) (2)
(b) Downstream of the Victoria Falls (1 x 2) (2)
2.3.4 What is the stream order up to the point marked 1. (1 x 2) (2)
2.3.5 Name the features at numbers 2, 3, 4 and 5 that are characteristic of stream capture. (4 x 2) (8)
[50]

QUESTION 3: 20 minutes 17 marks *(Various class notes and past papers)*

Carefully study the 1:50 000 topographical map extract 2829AC Harrismith and the accompanying 1:10 000 othophoto extract 2829AC 3 Harrismith

3.1 What is the latitude of spot height •2281 in H2? (1)
3.2 State if it is possible (under normal conditions), for a person standing at spot height •1747 (E3) to see the cemetery on Wessdoll farm (C4). Give a reason for your answer. (2)
3.3 What is the approximate area of the outlined part of the orthophoto map Marked B? (in square meters). (1)
3.4 A person walks in a straight line from spot height •1786 (G4) to trigonometrical station (trig beacon) Δ298 (H3).
3.4.1 Along what type of slope is the person walking? (1)
3.4.2 What is the bearing a person would follow when walking in a straight line from spot height •1786 (G4) to trigonometrical station Δ298 (H3)? (1)
3.4.3 What is the gradient of the person's walk? (3)
3.4.4 If a person walks in a straight line (from •1786 to Δ298) at an average speed of 2km per hour, approximately how long will the walk take? (1)

3.5 Study the unnamed river that rises on Platberg at D (H1) to where it leaves the map. Also study the Nuwejaarspruit from E (A4) to F (A2). Compare the fluvial characteristics of these rivers and the valleys in which they flow. Tabulate your answer. (4)

3.6 Which map projection is usually associated with large-scale topographical maps? (1)
3.7 What makes spatial data different from other data? Elaborate. (2)
[17]

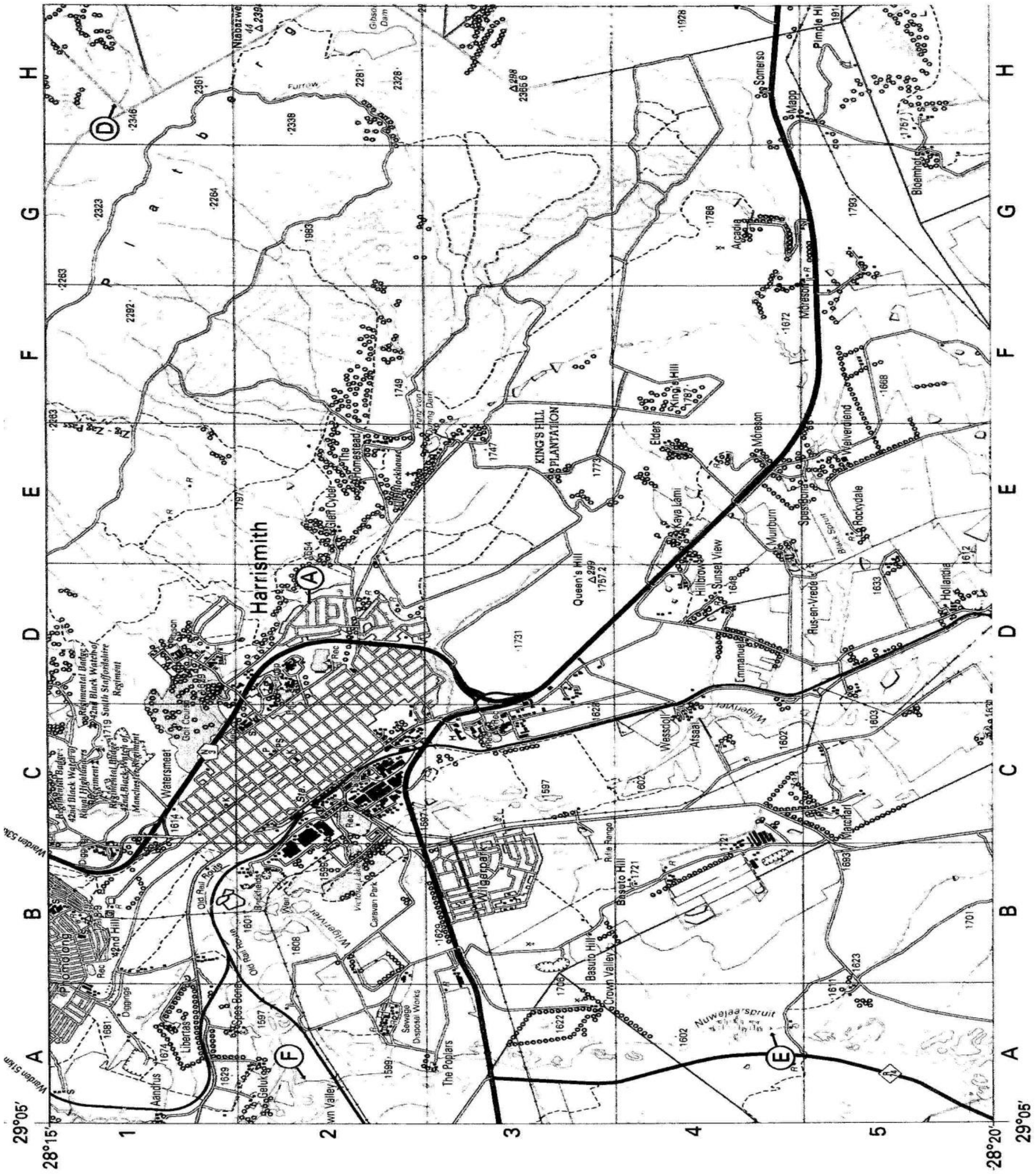


Plate 1 1 : 50 000 topographical HARRISMITH

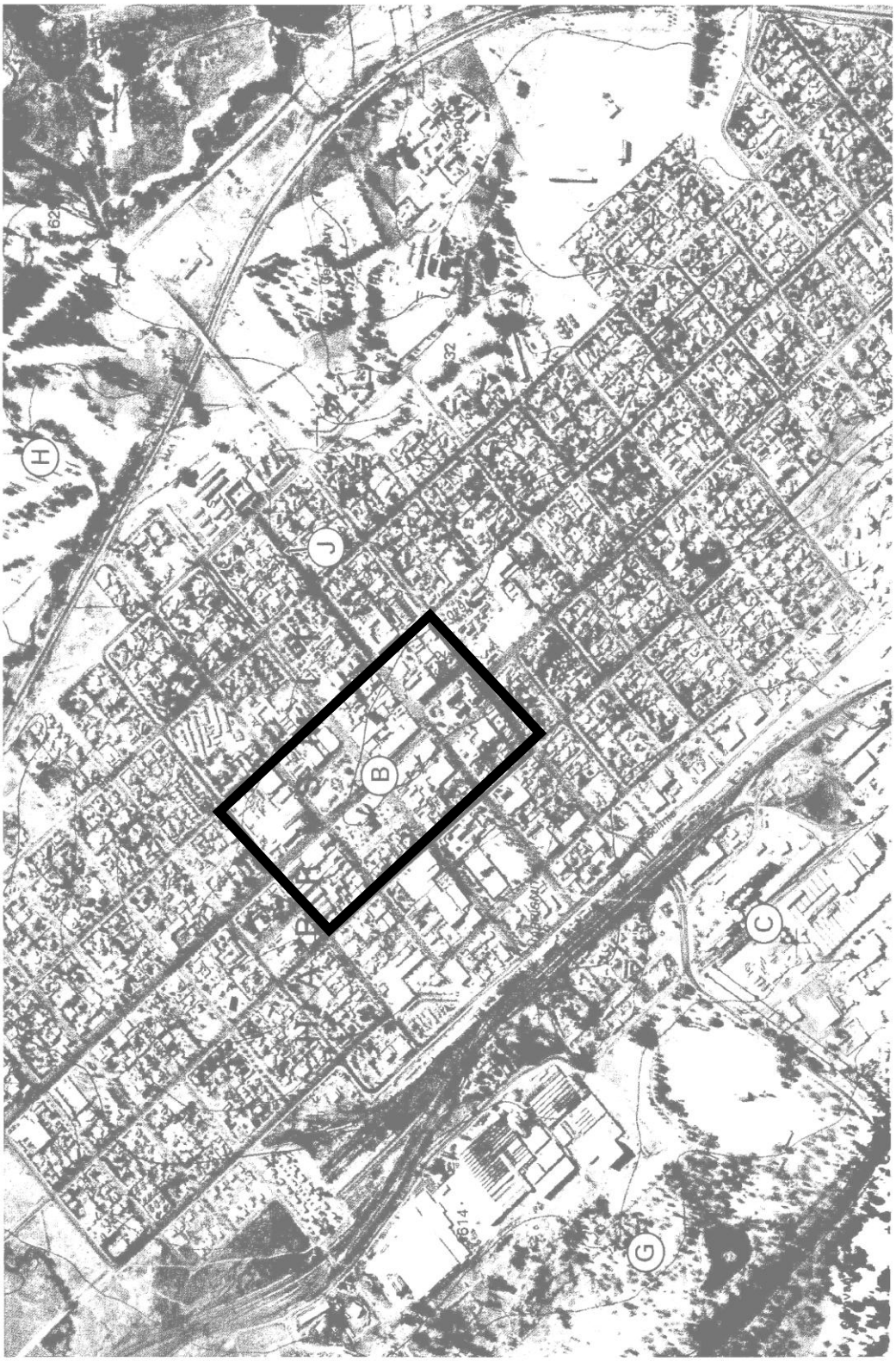
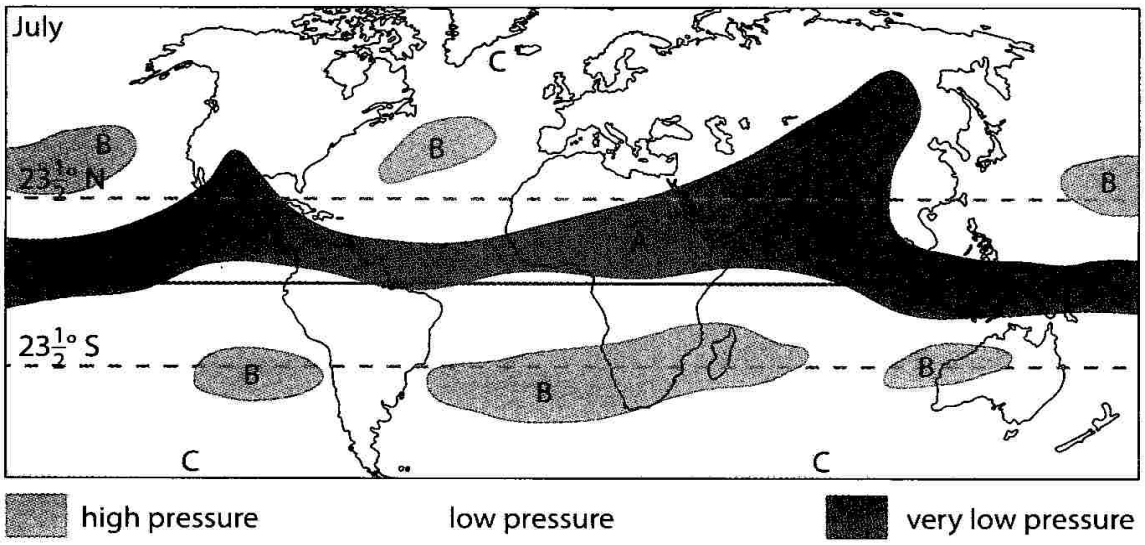


Plate 2 1 : 10 000 orthophoto HARRISMIT-

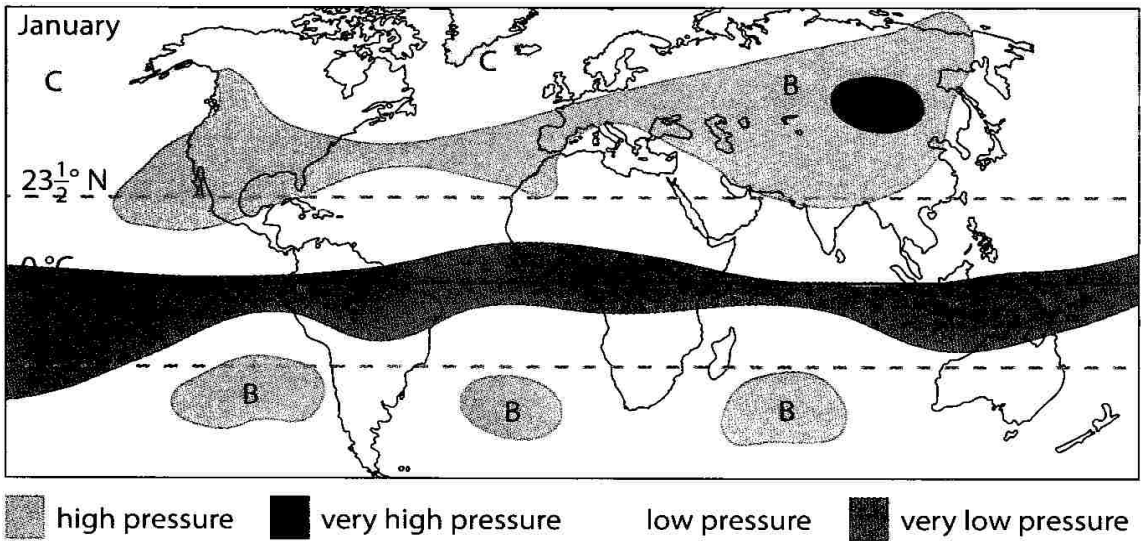
SECTION B: HOMEWORK

QUESTION 1: 30 minutes 40 marks *(Source: Previous NCS papers adapted)*

1.1 Study the maps of the pressure systems in July and January below before answering the questions that follow.



Pressure systems in July



Pressure systems in January

1.1.1 Name pressure belts A, B and C respectively. (3 x 1) (3)

1.1.2 What can be noticed with regard to the position of pressure belt A in July and its position in January? (1 x 2) (2)

1.1.3 Why does this pressure belt take up these positions? (1 x 2) (2)

1.1.4 Why does this pressure belt extend particularly far north over North America and Asia in July? (1 x 2) (2)

1.1.5 What has replaced this pressure belt in Asia in January? (1)

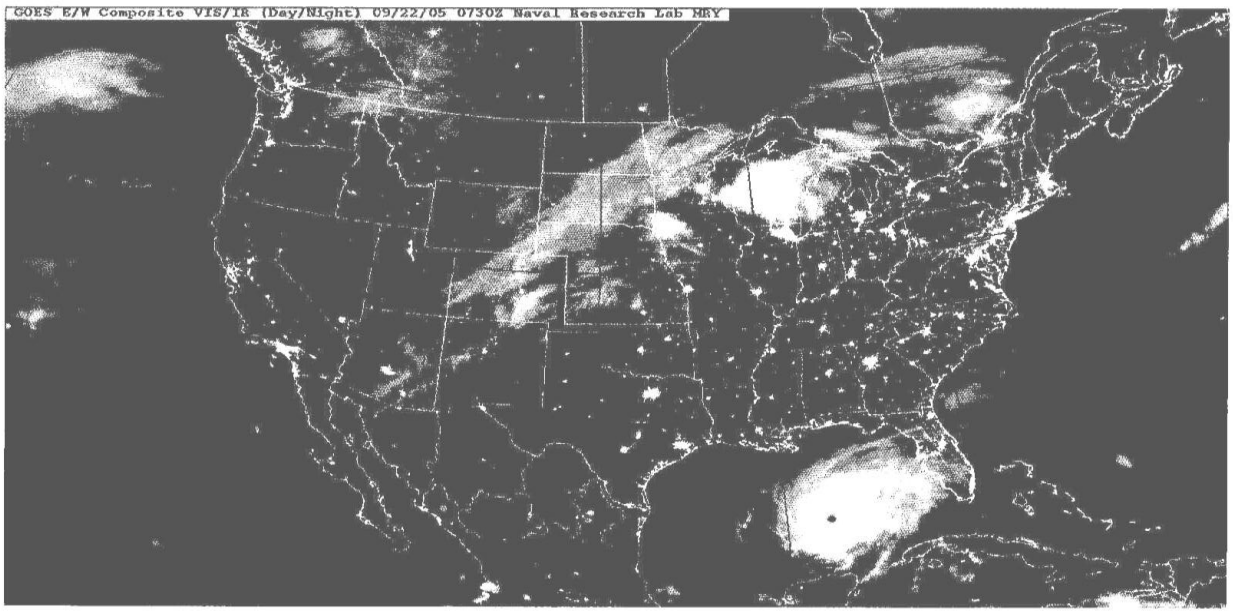
1.1.6 Why does this occur? (1 x 2) (2)

1.1.7 Why does pressure B consist of three cells over the ocean in the southern hemisphere in January? (1 x 2) (2)

1.1.8 What name is given to the latitudes influenced by pressure belt B? (1)

[15]

1.2 Look at the satellite image below and then answer the questions that follow.



Satellite image showing Hurricane Katrina moving towards New Orleans: 29 August 2005

1.2.1 How many hurricanes had occurred prior to Hurricane Katrina in this hurricane season? Motivate your answer. (2 x 1) (2)

1.2.2 How does this satellite image show that New Orleans is in the Northern Hemisphere? (1 x 2) (2)

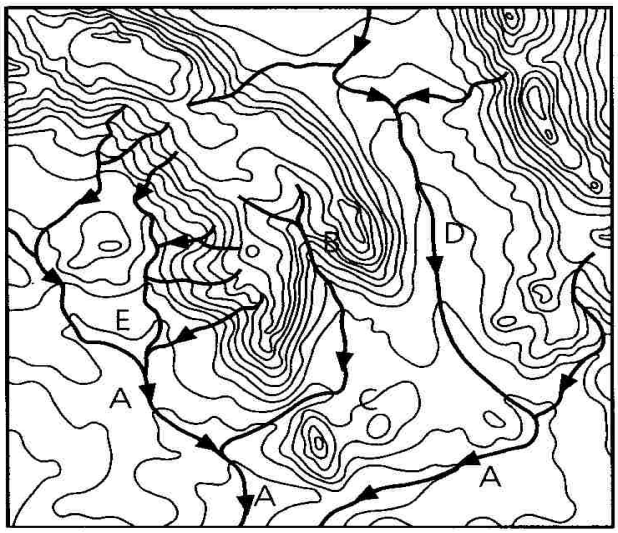
1.2.3 Describe and give reasons for the weather conditions in the eye of the hurricane. (4 x 1) (4)

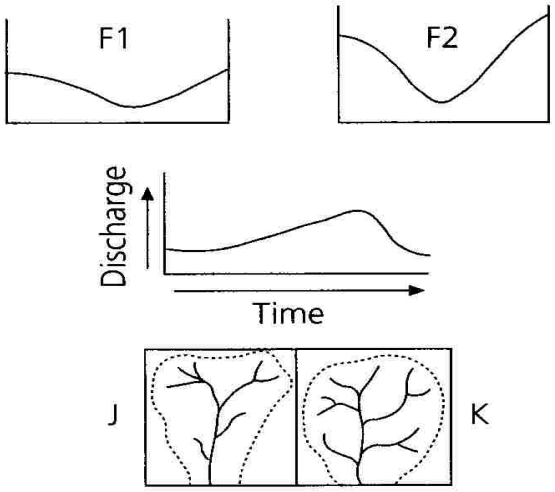
1.2.4 State the direction from which the hurricane came, and predict the direction in which it will move within the next 12 hours. (2 x 1) (2)

1.2.5 Explain why the hurricane will dissipate as it moves over the land. (5)

[15]

1.3 Study the contour sketch and illustrations below and answer the questions that follow.





1.3.1 How many major drainage basins are present on the map? (1 x 2) (2)

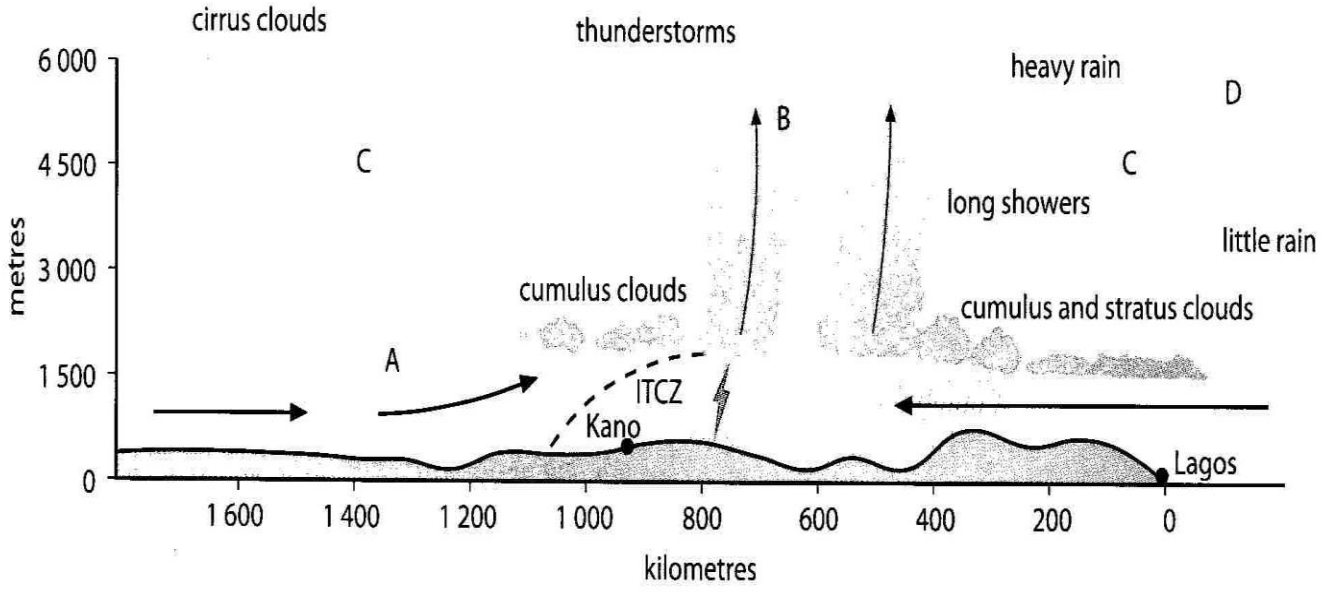
1.3.2 Briefly explain how you would determine the drainage density of one of the drainage basins. (1 x 2) (2)

1.3.3 Which one of the cross-profiles, F1 and F2, would you expect to find at B? Give two reasons for your answer. (1+1 x 2) (3)

1.3.4 What type of drainage pattern would you expect to find at C? Give one reason for your answer. (1+1 x 2) (3)
[10]

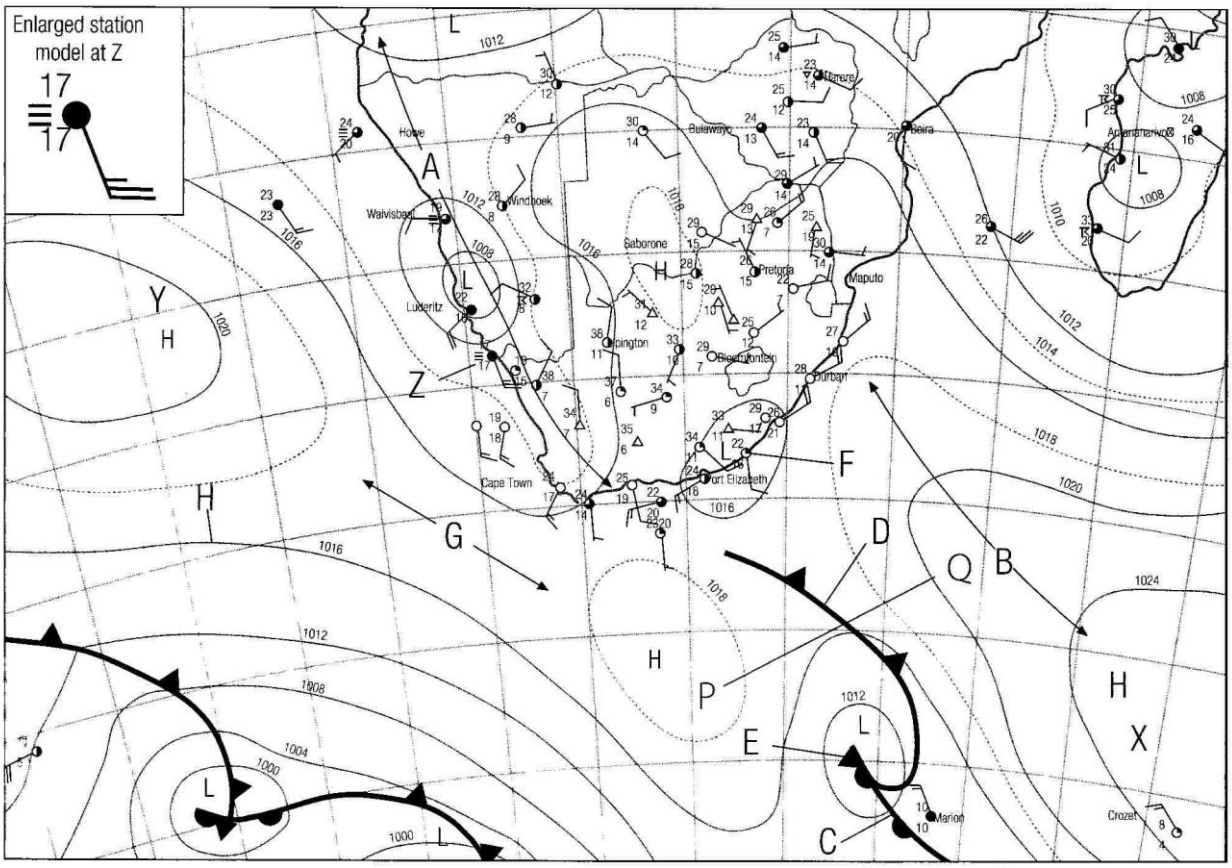
QUESTION 2: 30 minutes 50 marks *(Source: Previous NCS papers adapted)*

2.1 The diagram below is a cross-section through the ITCZ in June at Kano in West Africa



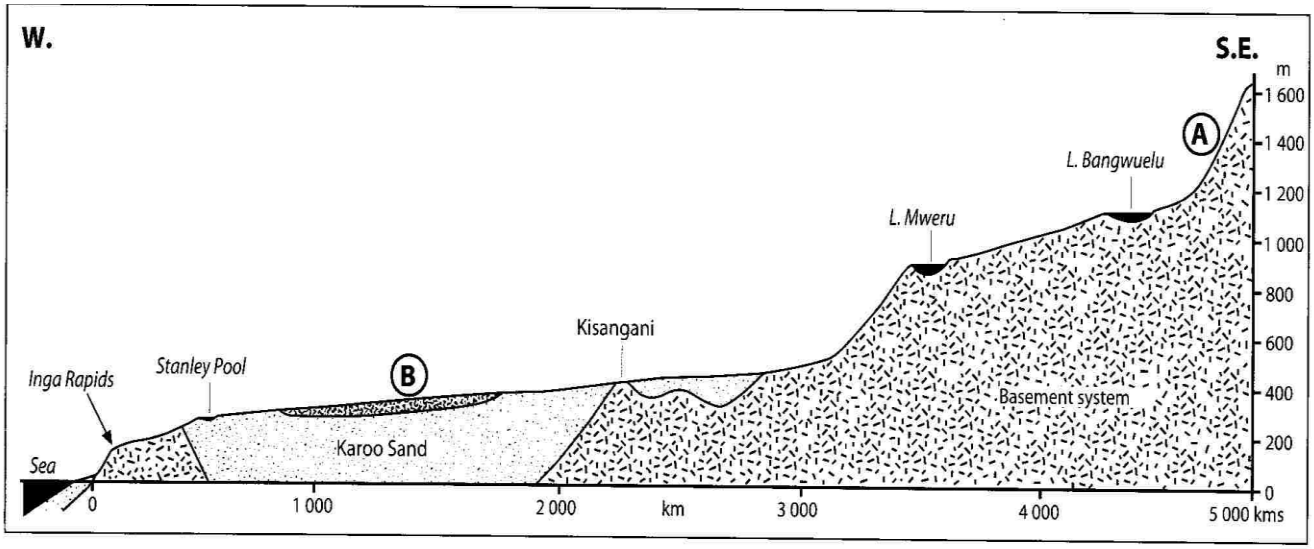
2.1.1 What does ITCZ stand for? (1)
2.1.2 Why is the rising of air so strong at the ITCZ? (1 x 2) (2)
2.1.3 Identify the winds at A. (1)
2.1.4 Identify the type of clouds at B. (1)
2.1.5 Which three-dimensional primary cell is found at C? (1)
2.1.6 Does Kano lie in the northern or southern hemisphere? Motivate your answer. (2 x 1) (2)
2.1.7 Why is there 'little rain'at D? (1 x 2) (2)
[10]

2.2 Study the synoptic chart below and then answer the questions that follow.



2.2.1 Give the correct synoptic terms for the features labelled A to H respectively. (8 x ½) (4)
2.2.2 Name the two high-pressure cells labelled X and Y respectively. (2 x 1) (2)
2.2.3 To which pressure belt do X and Y belong? (1)
2.2.4 Describe all air movement and weather associated with the cells of pressure named in the previous question. 2 x 2) (4)
2.2.5 Use the station model to describe the weather at station Z. (6 x ½) (3)
2.2.6 What two factors shown on this synoptic chart indicate that this is a summer chart? (2 x 1) (2)
2.2.7 C, D and E are part of a larger synoptic feature. Identify this feature and, giving a reason, predict the direction in which it will move. (3)
2.2.8 Draw a sketch cross-section from P to Q to show the weather that is associated with feature D. (5)
[24]

2.3 Study the longitudinal profile from west to south-east of the Congo River, found below. The Congo River is a perennial river. Answer the questions that follow.



The longitudinal profile of the Congo River

2.3.1 With reference to the profile, define (a) longitudinal profile and (b) local base level. (2 x 1) (2)

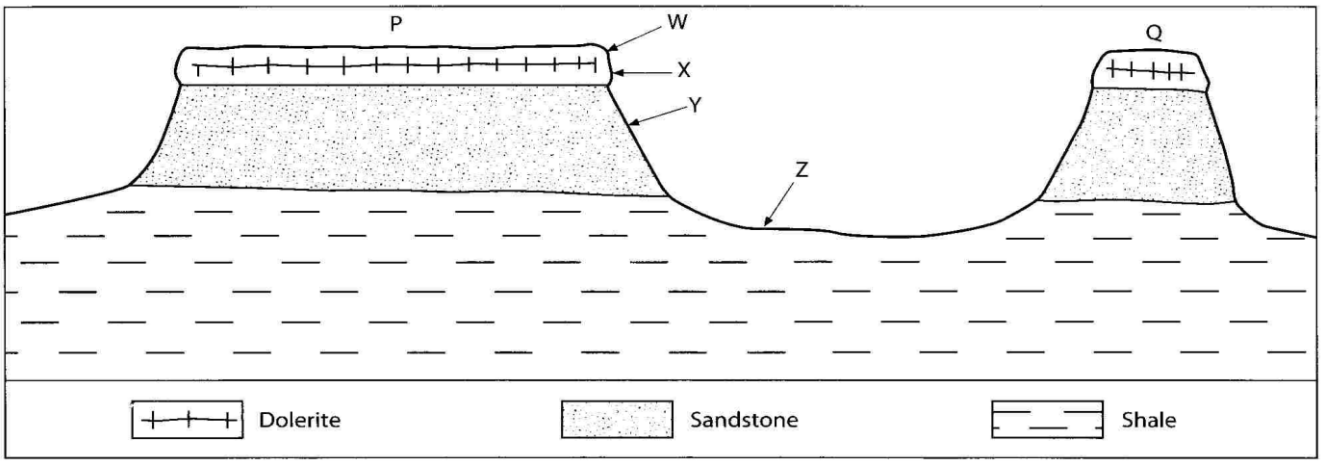
2.3.2 Compare and contrast the type of river flow that you would expect at A and B along the profile. (2 x 2) (4)

2.3.3 The Inga Rapids are the site of a planned hydroelectric power scheme. Give two advantages of this site for such a scheme. (2 x 1) (2)

2.3.4 Imagine a drop in sea level by 200 meters. Draw the new longitudinal river profile of the Congo River to show this, and clearly label the features that would probably result. (4)

[12]

2.4 The illustration below shows a cross-section through a structural landscape. Study it and then answer the questions that follow.



2.4.1 Identify the landforms indicated by P and Q respectively. (2 x 1) (2)
2.4.2 List the four slope forms labelled W, X, Y and Z respectively. (4 x ½) (2)
[4]

SECTION C: SOLUTIONS AND HINTS TO SECTION A

QUESTION 1

1
1.1.1 D√√
1.1.2 D√√
1.1.3 D√√
1.1.4 B√√
1.1.5 A√√ (5 x 2) (10)
1.2
1.2.1 Winter√√
Date√√
Cold front far north√√
OR
(Low temperatures√√) (Any 2 reasons) (3 x 2) (6)
1.2.2 1010mb/hPa√√ (1 x 2) (2)
1.2.3 NW√√
15 knots√√
Clockwise rotation around LP√√
Geostrophic wind√√ (4 x 2) (8)
1.2.4 Winds will veer to South West√√
Rain will occur√√
Temperature will drop√√ (3 x 2) (6)
1.2.5 Family(ies) √√ (1 x 2) (2)

1.3
1.3.1 Northern hemisphere√√ (1 x 2) (2)
1.3.2 A storm is mild and can lead to the development of a cyclone√√ (1 x 2) (2)
1.3.3 It moved from east to west √√and away from the equator√√
Tropical easterlies drove it√√
Centrifugal force pushed it away from the equator√√ (4 x 2) (8)
1.3.4 It will move northwards and if it reaches the westerlies√√ it will move eastwards causing it to dissipate√√ (2 x 2) (4)
[50]

QUESTION 2

2.1
2.1.1 K√√
2.1.2 J√√
2.1.3 B√√
2.1.4 D√√
2.1.5 E√√ (5 x 2) (10)

2.2

2.2.1 When an equilibrium / balance has been reached between erosion and deposition in the stream√√ (1 x 2) (2)

2.2.2 Smooth, concave longitudinal profile√√

OR

Longitudinal profile steep in upper reaches and gradual in lower reaches (Any ONE) (1 x 2) (2)

2.2.3 Needs more energy to overcome high friction index in upper reaches and to transport large stream load particles√√

Needs less energy to overcome low friction index in lower reaches and to transport small stream load particles√√ (2 x 2) (4)

2.2.4 Stream gains energy and starts to erode downwards into the landscape (concept) √√ (1 x 2) (2)

2.2.5 Knickpoint waterfall√√ (1 x 2) (2)

2.2.6 (Any TWO)

- Increased precipitation√√
- Increase in volume of water√√
- Stream capture√√
- Reduction in vegetation increases run-off√√
- Drop in sea-level√√
- Isostic uplift of land√√ (2 x 2) (4)

2.2.7 Temporary√√ (1 x 2) (2)

2.2.8 In time the waterfall will be eroded away√√ (1 x 2) (2)

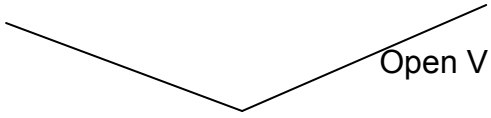
2.3

2.3.1 Uniformly resistant rock probably horizontal sedimentary rock√√ (1 x 2) (2)

2.3.2 (Any TWO)

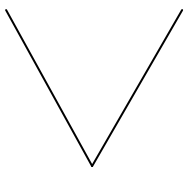
Lake Kariba√√ , Victoria Falls√√, or dam (2 x 2) (4)

2.3.3 (a)



Open V √√ (1 x 2) (2)

(b)



Closed V √√ (1 x 2) (2)

2.3.4 3√√ (1 x 2) (2)

2.3.5 2 = captured stream√√

3 = elbow of capture√√

4 = Misfit stream√√

5 = river gravels or wind gap√√ (4 x 2) (8)

[50]

QUESTION 3

3.1 28º16'40"S √ (1)

3.2 No √ Intervening high ground (Queens Hill) √ (2)

3.3 5,1 cm x 3,1 cm
(5,1 x 100) x (3,1 x 100)
510m x 310m
158 100m²√ (1)

3.4

3.4.1 Concave slope√ (1)

3.4.2 41º√ (1)

3.4.3 Gradient = $\frac{VI}{HE}$

$= \frac{2365,5 - 1786}{4,6cm}$ √

$= \frac{579,5}{4,6 \times 500}$

$= \frac{579,5}{2300}$

$= \frac{579,5 \div 579,5}{2300 \div 579,5}$ √

$= \frac{1}{3,968}$

= 1: 3,968 √ (3)

3.4.4 2 hours 15 minutes √ (1)
(4,6cm x500
2300m
Walks at 2km per hour
2000m an hour
300m ÷ 2000 takes 15 minutes
2 hr 15 min)

3.5 (Any FOUR) √√√√ (4)

Unnamed river	**Nuwejaarspruit**
Concave longitudinal profile	Flat longitudinal profile
Flows down steep gradient	Flows down gentle gradient
Upper course	Lower/middle course
No flood plain	Wide flood plain
Has no ox-bow lakes	Has ox-bow lakes
Slower flowing	Faster flowing
Turbulent flow	Laminar flow

3.6 Transverse Mercator projection√ (1)

3.7 They store location in some way√
(Any ONE)
- As coordinates√
- As addresses√
- As place names√ (2)

[17]

SESSION 10

TOPIC: CLIMATOLOGY, GEOMORPHOLOGY AND GIS CONSOLIDATION EXERCISES

Learner Note: In the prelim and final papers the geomorphology section is equally mixed with climatology in the first two questions in Section A. You need to know your work really well to get good marks for section A in the final exam. You must also be able to apply your knowledge as there are some interpretation questions where you need to understand the processes involved in geomorphology and climatology. These applications also apply to the map work interpretation. You must put in a lot of effort to get to know this part of the work well. You must know the facts as you will not get marks for vague answers.
For session 12 you will be assessed on the above mentioned topics in various ways in order to prepare you for various question styles during the June examination.

SECTION A: TYPICAL EXAM QUESTIONS

QUESTION 1: **40 minutes** **60 marks** *(Source: NCS Feb/March 2010)*

1.1 Refer to FIGURE 1.1 showing a weather system that often occurs along the east coast of Southern Africa.

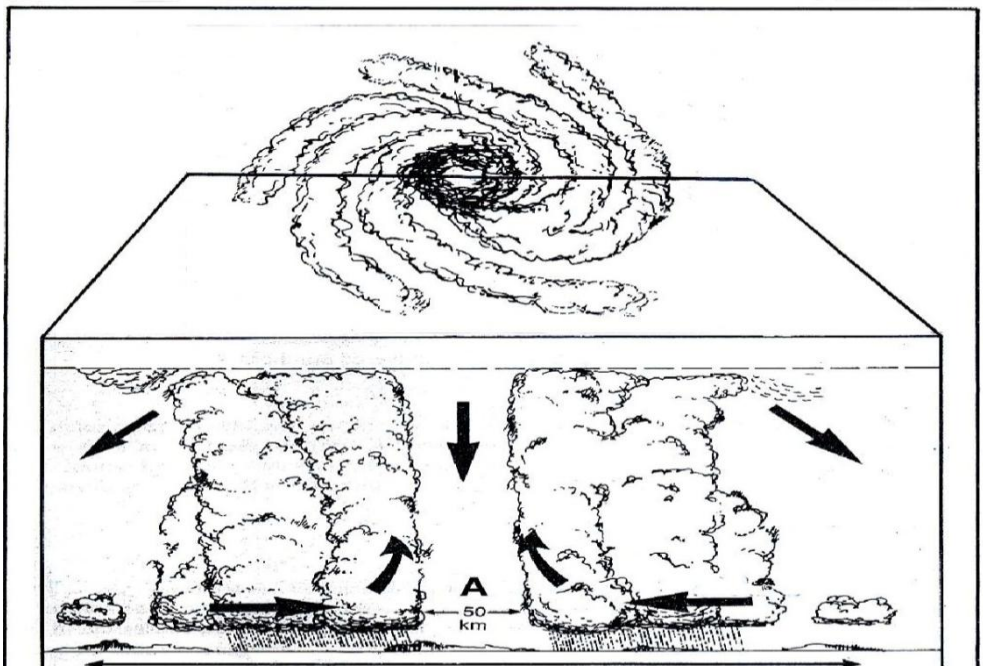


Figure 1.1

Various options are given as possible answers to the questions that follow. Choose the answer and write only the letter (A – D) next to the question number (1.1.1 – 1.1.5) for example 1.1.6 A.

1.1.1 The diagram illustrates a …

A mid-latitude cyclone.
B coastal low pressure.
C line thunderstorm.
D tropical cyclone.

1.1.2 The following air movements are associated with the illustrated weather system along the coast of Southern Africa:

A Subsidence, convergence, clockwise rotation, uplift
B Uplift, divergence, anticlockwise rotation, subsidence
C Uplift, divergence, clockwise rotation, subsidence
D Subsidence, divergence, anticlockwise rotation, uplift

1.1.3 The main cloud types associated with this weather system are … clouds.

A cumulonimbus
B cumulus
C cirrus
D nimbostratus

1.1.4 The following conditions will exist at **A**:

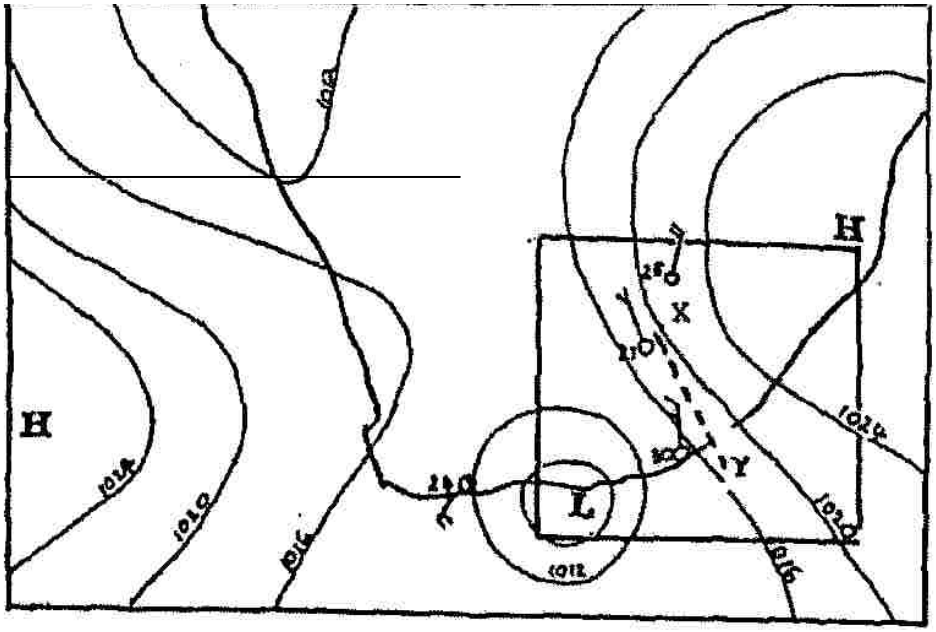
A Cloudless, low pressure, windless
B Cloudless, high pressure, windless
C Cloudy, low pressure, light rain
D Cloudy, high pressure, heavy rain

1.1.5 The weather system is in the … stage of development.

A initial/formative
B immature
C mature
D decaying/dissipating (5 x 2) [10]

1.2 FIGURE 1.2 shows a berg wind that often occurs along the south coast of South Africa. Use your knowledge of berg winds and also refer to FIGURE 1.2 to answer the questions below.

Figure 1.2



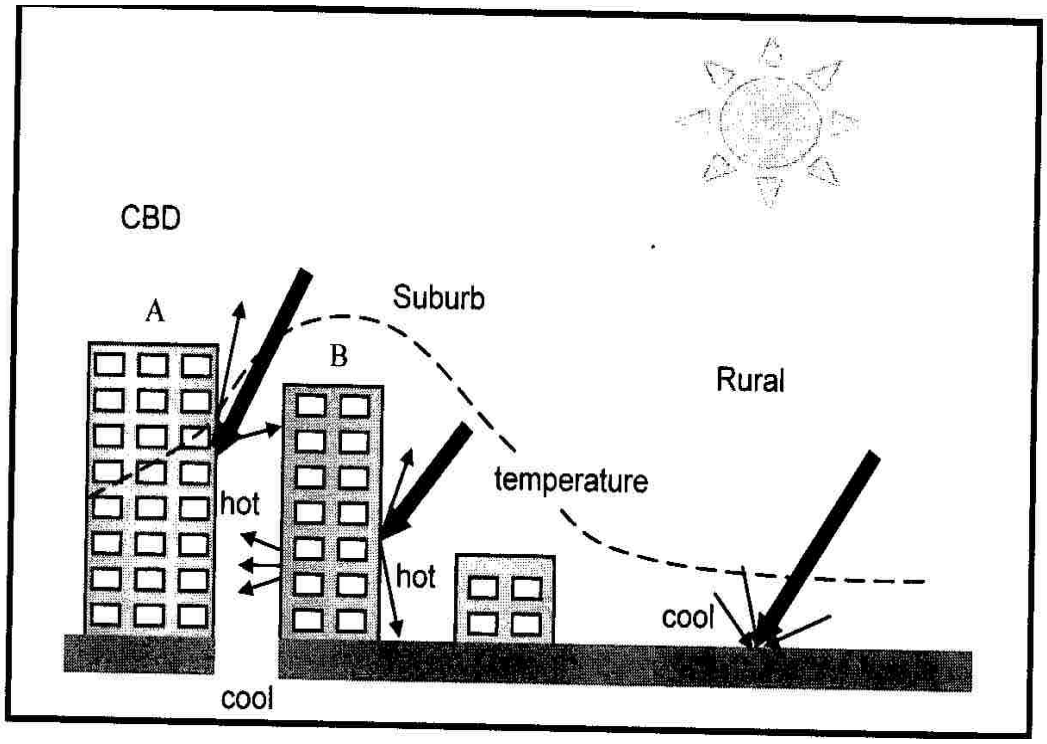
1.2.1 In the diagram name the cell which is having the biggest impact on weather conditions? (1 x 2) (2)

1.2.2 Explain and account for the impact it is having on temperatures. (You should make use of a diagram to help explain your answer). (4 x 2) (8)

[10]

1.3 Refer to Figure 1.3 on the following page, which shows a typical South African city.

FIGURE 1.3



1.3.1 What do we call this type of weather phenomena? (1 x 2) (2)

1.3.2 What is the sketch trying to depict by means of the large arrows? (1 x 2) (2)

1.3.3 What factors are responsible for higher temperature over the CBD? (3 x 2) (6)

1.3.4 Explain the air circulatory pattern experienced during the day. (2 x 2) (4)

1.3.5 Why is pollution over this city worse in winter than in summer? (3 x 2) (6)
[20]

1.4

1.4.1 What is the Kyoto protocol? (2 x 2) (4)

1.4.2 How can third world nations reduce climate change? (3 x 2) (6)
[10]

1.5 Provide suitable explanations for the following terms:

1.5.1 Hadley cell

1.5.2 ITCZ

1.5.3 Adiabatic heating

1.5.4 Latent heat

1.5.5 Aspect (5 x 2) [10]
[60]

QUESTION 2: 30 minutes 40 marks

(Source NCS Feb/March 2010 and various previous papers)

2.1 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number

2.1.1 An aquifer is a rock that is impermeable and does not allow water to move through it.

2.1.2 A flow hydrograph records how much water passes a given point in a given period of time.

2.1.3 A periodic river is a river that only flows in the rainy season when it receives ground water.

2.1.4 Rocks that are uniformly resistant and exposed to the same type of weathering will weather at different rates.

2.1.5 Core stones are rounded stones that are exposed after erosion to make up a tor. (5 x 2) (10)

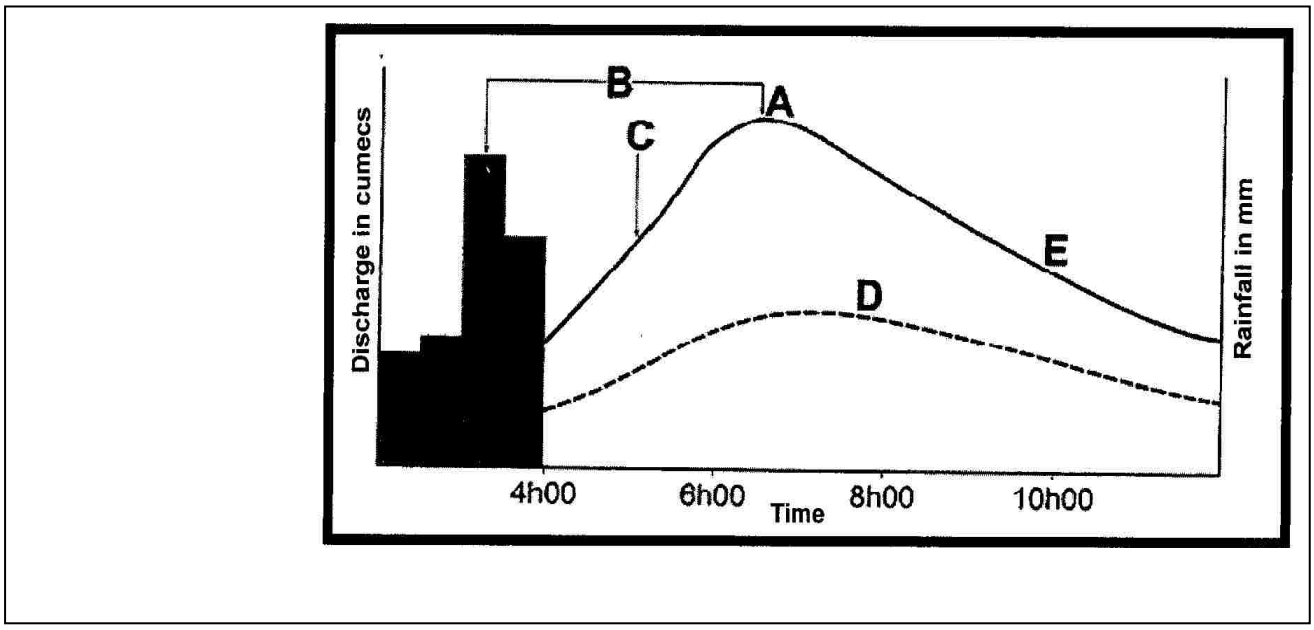
2.2 Define the following terms:

2.2.1 Drainage basin (1 x 2) (2)

2.2.2 River system (1 x 2) (2)

[4]

2.3 The following hydrograph depicts the Zambezi River shortly before it enters the Indian Ocean



2.3.1 Supply labels B, A and D. (3 x 2) (6)

2.3.2 At what approximate time did the maximum rainfall occur? (1 x 2) (2)

2.3.3 Account for the difference in shape between lines C and E. (2 x 2) (4)

2.3.4 Supply the correct name of the place where two tributaries join each other. (1 x 2) (2)
2.3.5 List the factors that will influence how quickly line D increases. (5 x 2) (10)
2.3.6 Define what is meant by a flood. (1 x 2) (2)
[26]
[40]

QUESTION 3: 20 minutes 20 marks *(Source: NCS Feb/March 2010)*

GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

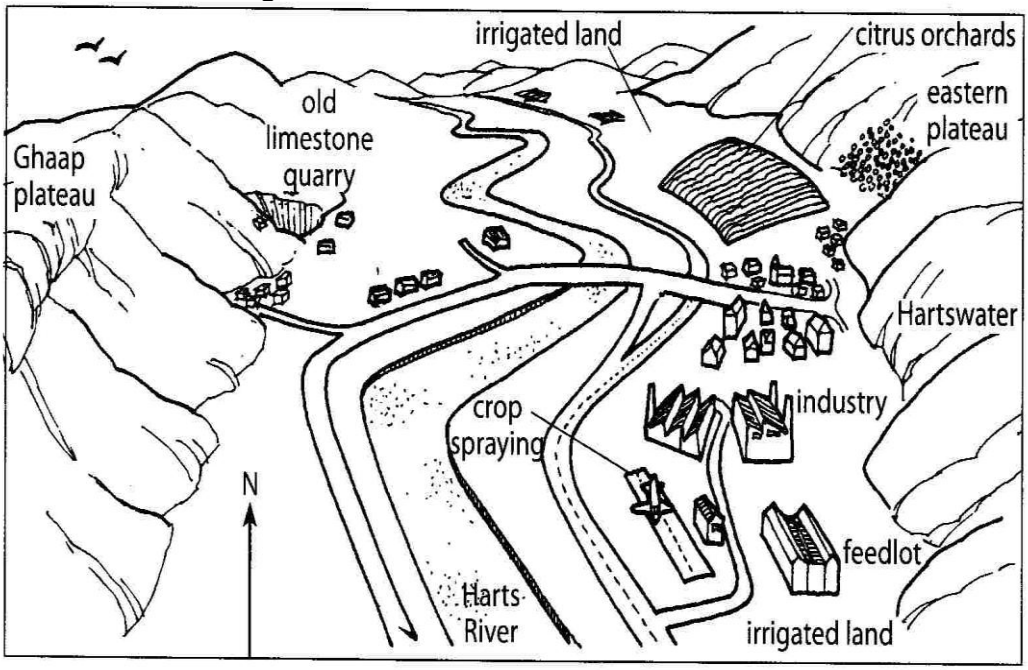
3.1 Name any TWO components of GIS. (2 x 2) (4)

3.2 Identify any example of a polygon feature, a line feature and a point feature respectively, on any topographical map. (3 x 2) (6)
3.3 Explain what is meant by data integration. (1 x 2) (2)
3.4 Name ONE problem that was experienced with data integration prior to the introduction of GIS. (1 x 2) (2)
3.5 Of what importance is data integration to a geographer? (1 x 2) (2)
3.6 What is a database? (1 x 2) (2)
3.7 Why is it sometimes necessary to manipulate data in a database? (1 x 2) (2)
[20]

SECTION B: HOMEWORK

QUESTION 1: 30 minutes 50 marks *(Source: X-Kit Geography Gr. 12 FET Phase)*

1.1 Study the field sketch below and then explain, from a local climate point of view, each of the following:



1.1.1 Why are citrus orchards, which are damaged by frost, grown on the slopes of this valley? (1 x 2) (2)

1.1.2 Why does a blanket of fog and smog cover this valley on some winter mornings? (2 x 2) (4)

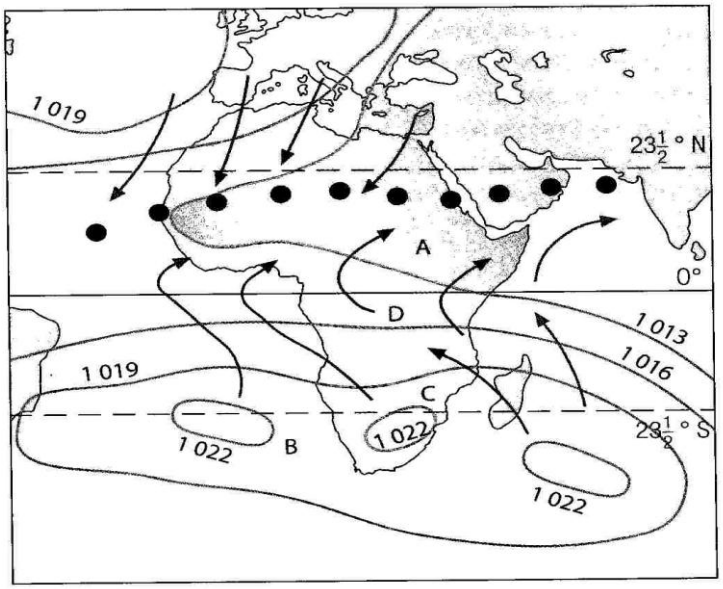
1.1.3 What is the reason for the residential areas of Hartswater being affected by industrial pollution in the afternoon? (2 x 2) (4)

1.1.4 Why are the residential sites on the hill popular for settlement? (1 x 2) (2)

1.1.5 What are the reasons for temperatures in Hartswater being a little warmer than the surrounding farmlands? (Any THREE) (3 x 2) (6)

[18]

1.2 Study the diagram below and answer the questions that follow.



1.2.1 Name the feature shown by •••••• (1 x 2) (2)

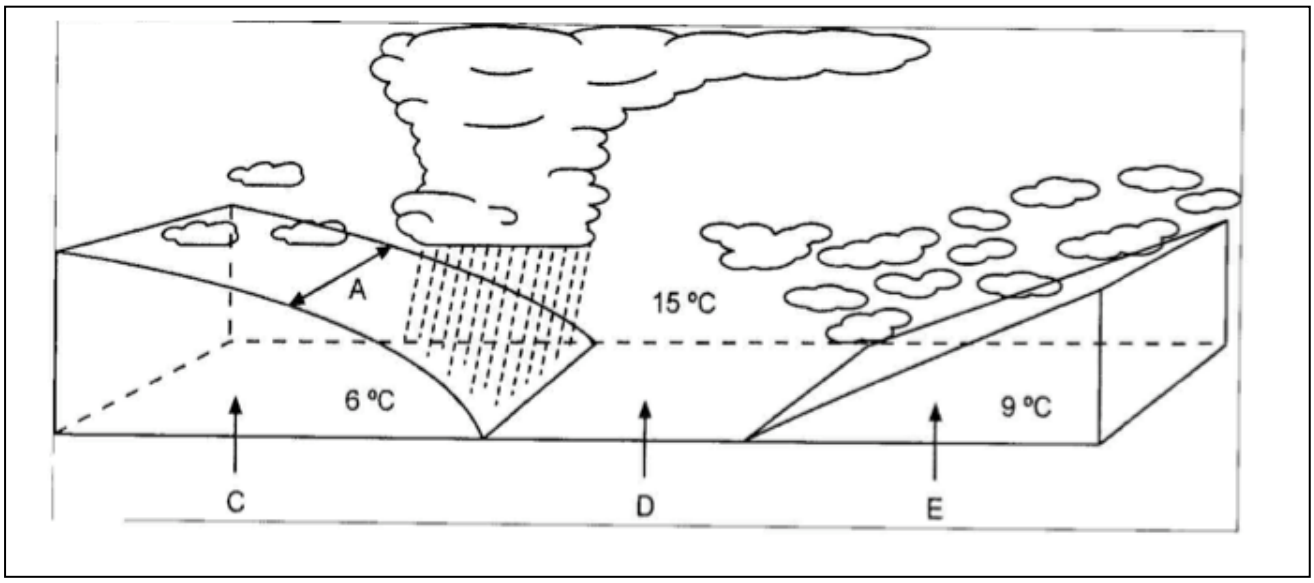
1.2.2 Name the pressure at A. (1 x 2) (2)

1.2.3 Name the pressure belt at B. (1 x 2) (2)

1.2.4 Why has this belt split into three cells? (2 x 2) (4)

[10]

1.3 The figure below illustrates a cross-section through the mature stage of a mid-latitude cyclone



1.3.1 Which letter marks the cold front? (1 x 2) (2)

1.3.2 In a table, draw up a comparison of the warm and cold fronts of a mid-latitude cyclone in its mature stage. Include the following aspects:

- Steepness of front
- Associated cloud types
- Type of rainfall (3 x 2) (6)

1.3.3 What is the sector called at D? (1 x 2) (2)

1.3.4 What is the sector called at E? (1 x 2) (2)

1.3.5 How does the weather experienced at position E differ from that experienced at position D? (3 x 2) (6)

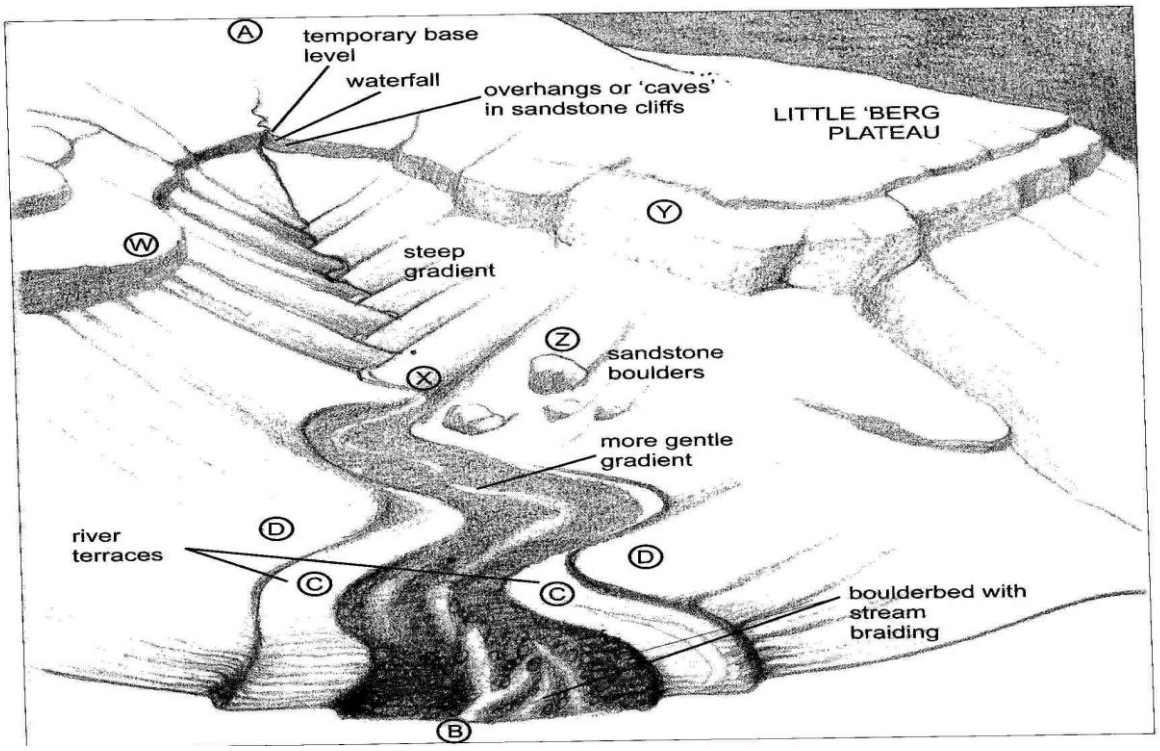
1.3.6 The diagram illustrates a mid-latitude cyclone in the mature stage. What is the next stage and what processes have taken place? (1 + 3) (4)

[22]

[50]

QUESTION 2: 30 minutes 50 marks *(Source: X-Kit Geography Gr. 12 FET Phase)*

2.1 Study the diagram on the following page and answer the questions that follow.



2.1.1 With reference to the diagram explain the terms 'temporary base level' and 'stream braiding'. (2 x 2) (4)

2.1.2

(a) Draw a simple longitudinal profile of this river from A to B, and label the waterfall. (4)

(b) Does the longitudinal profile from A to B show a graded profile? Explain your answer. (2 x 2) (4)

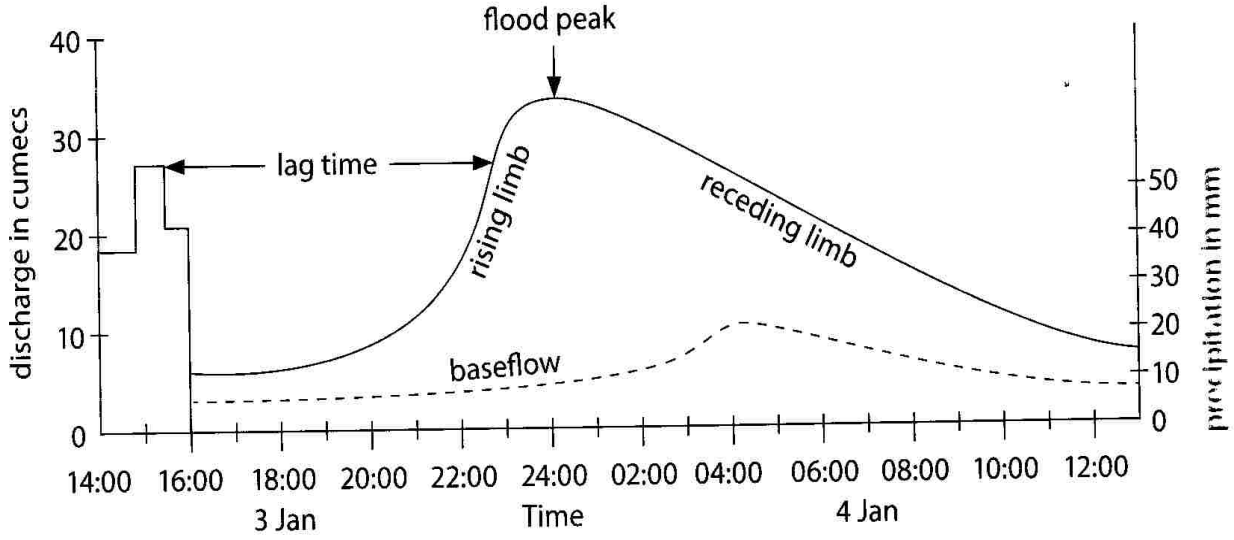
2.1.3 The river terraces at C are evidence that this river has been rejuvenated.

(a) Explain the term rejuvenation. (1 x 2) (2)

(b) Using an annotated sketch, describe how the process of rejuvenation led to the formation of these river terraces. (3 x 2) (6)

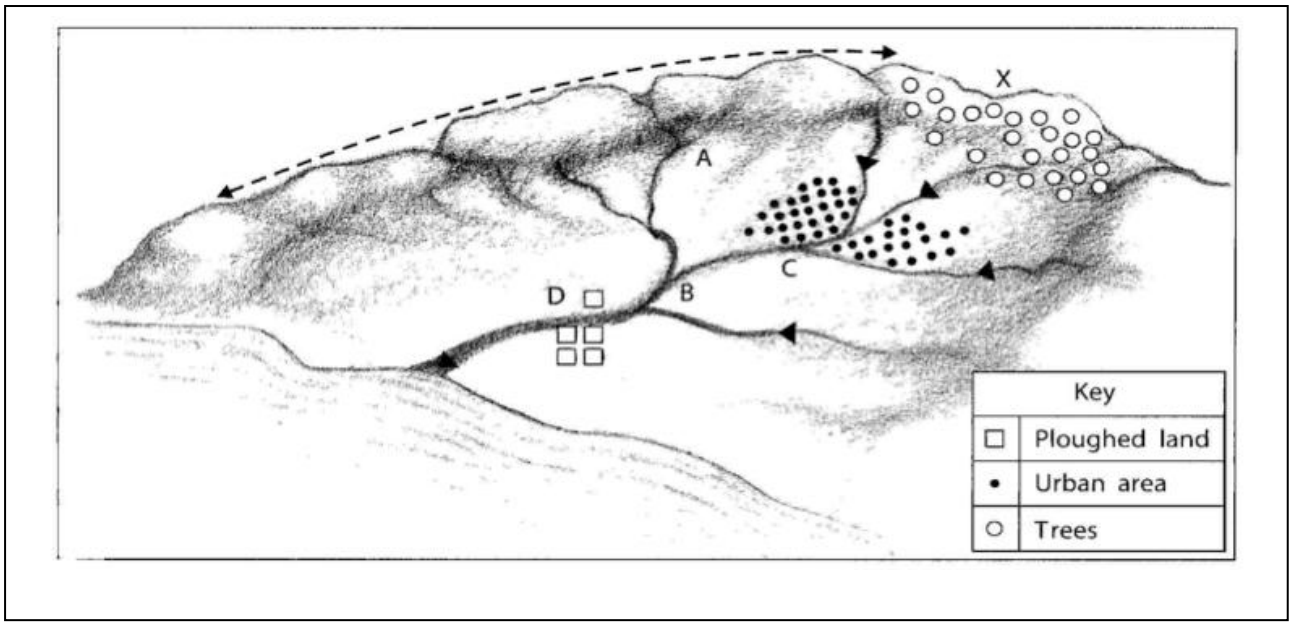
[20]

2.2 Look at the figure below and answer the following questions:



2.2.1 When did the maximum rain occur? (1 x 2) (2)
2.2.2 What was the discharge of the river before the storm occurred? (1 x 2) (2)
2.2.3 What was the height of the flood peak? (1 x 2) (2)
2.2.4 What is the lag time? (1 x 2) (2)
2.2.5 How long did it take for the river discharge to drop from the flood peak to what it was before the storm took place? (1 x 2) (2)
[10]

2.3 Look at the illustration below and answer the questions that follow

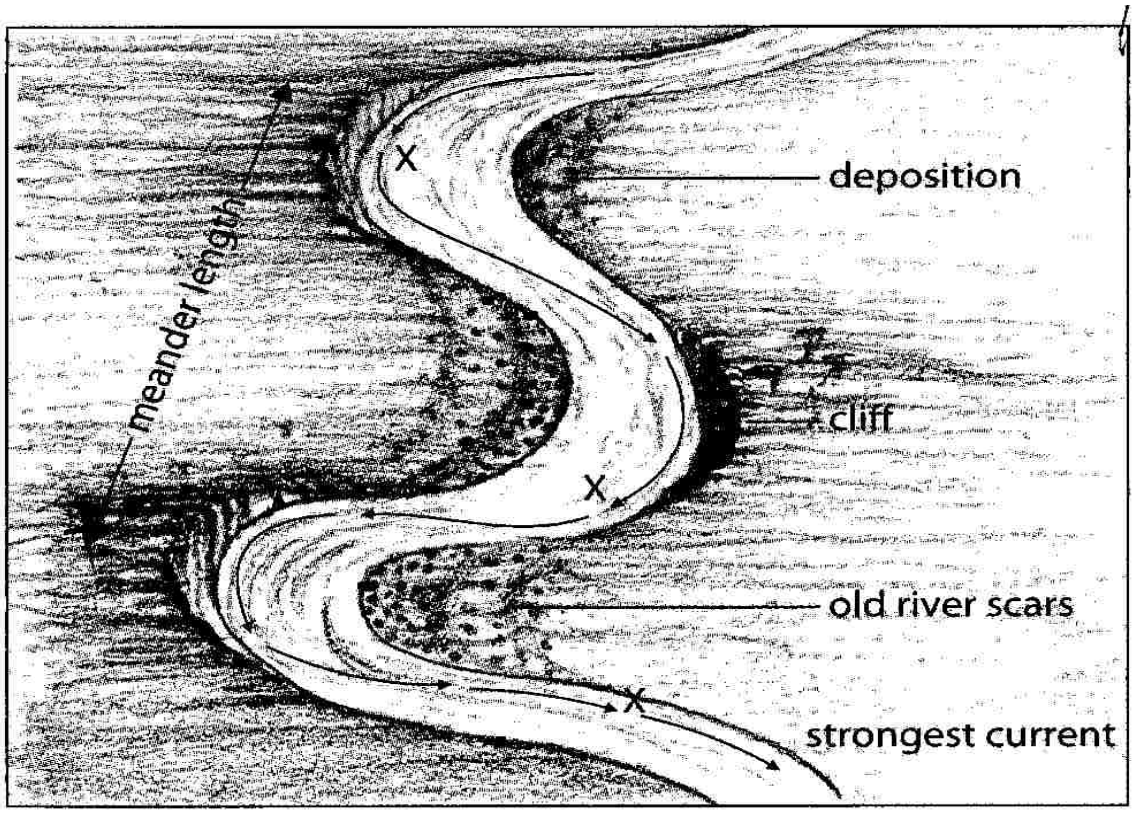


2.3.1 Explain in what way and why the energy characteristics of the river will change between A and B. (2 x 2) (4)
2.3.2 Explain, with motivation, the reason for the great amount of silt in the river at C. (2 x 2) (4)
2.3.3 How and why will the volume of the river change downstream of D? (2 x 2) (4)
2.3.4 In what way and why will the energy change if deforestation takes place at X? (1 x 2) (2)
[14]

2.4 Look at the illustration below and answer the questions that follow.

2.4.1 What term is given to the pattern of the river? (1 x 2) (2)

2.4.2 Study the pattern made by the river current at X in the illustration. What do you notice about the position of the current and the river bank that it is related to? (2 x 2) (4)



[6]
[50]

SECTION C: SOLUTIONS AND HINTS TO SECTION A

QUESTION 1

1.1.1 D √√
1.1.2 A √√
1.1.3 A √√
1.1.4 A √√
1.1.5 C √√ (5 x 2) [10]

1.2.1 Coastal low pressure √√ (1 x 2) (2)

1.2.2 Air descends the plateau √√
Warms adiabatically √√
Subsiding air does not allow for condensation to take place √√
It is dry since it is an offshore wind √√

It decreases atmospheric humidity √√
[Any FOUR. Must refer to temperature and humidity, and use a diagram] (4 x 2) (8)
[10]

1.3.1 Heat Island√√ (1 x 2) (2)
1.3.2 The angle of the sun's rays (aspect) (1 x 2) (2)
1.3.3 Artificial materials like to absorb heat√√
Metals and glass reflect heat√√
Combustion processes√√
Pollution traps long wave radiation√√ (Any THREE) (3 x 2) (6)
1.3.4 During the day the heat dome rises in altitude√√ which allows fresh clean fresh air to be fed into the city. √√ (2 x 2) (4)
1.3.5 In winter the inversion layer is lower√√ causing pollution to be concentrated√√ close to the ground. In winter more pollution is emitted by the burning of wood and fossil fuels. √√ (3 x 2) (6)
[20]

1.4
1.4.1 An international convention held in 1997√√ where it was agreed to reduce greenhouse emissions. 137 countries signed it. √√ (2 x 2) (4)
1.4.2 Reduce the burning of wood and fossil fuels√√
Look at using cleaner fuels such as gas, solar wind power√√
Protect natural environment, especially deforestation√√ (3 x 2) (6)
[10]

1.5
1.5.1 Air that rises near the equator and descends at ±30º from the equator√√
1.5.2 Inter-tropical convergence zone is an area of intense solar heating that moves north and south with the seasons. √√
1.5.3 Air that warms up as it is compressed√√
1.5.4 When water vapour condenses it releases heat into the atmosphere which is called latent heat√√
1.5.5 The relationship between the ground and the angle of the sun's rays√√
(5 x 2) [10]
[60]

QUESTION 2

2.1
2.1.1 False√√
2.1.2 True√√
2.1.3 True√√
2.1.4 False√√
2.1.5 True√√ (5 x 2) [10]

2.2
2.2.1 The total area drained by the river system √√ [Concept] (1 x 2) (2)
2.2.2 The main river and all its tributaries √√ [Concept] (2 x 1) (2)
[4]

2.3
2.3.1 B – lag time√√
A – peak flow / run-off√√
D – base flow√√ (3 x 2) (6)
2.3.2 Just before 4h00√√ (1 x 2) (2)
2.3.3 Shape of drainage basin caused rising limb to be steep. C is the rising limb and is increasing rapidly because of the shape of the drainage basin. √√ D is the falling limb and indicates a gradual decrease in volume√√ (2 x 2) (4)

2.3.4 Confluence√√ (1 x 2) (2)

2.3.5 Gradient√√
Amount of vegetation√√
Intensity of rainfall√√
Height of water table√√
Rock type√√ (5 x 2) (10)

2.3.6 Situation that develops when a river overflows its banks and covers areas with water that is usually not covered by water√√ [Concept] (1 x 2) (2)

[26]

[40]

QUESTION 3

3.1

- Hardware √√
- Software √√
- Data √√
- People √√
- Procedures √√
- Network √√ [Any TWO] (2 x 2) (4)

3.2 Polygon feature:
cultivated land √√
woodland √√
sewage disposal works √√
cemetery √√
slimes dam √√
mine dump √√
Line feature:
built-up area √√
non-perennial river √√
other road √√
national route √√
track/hiking trail √√
Point feature:
railway line √√
fountain √√
trees √√ [Any ONE for each type of feature] (3 x 2) (6)

3.3

3.3.1 The integration of data from different maps into one map which summarises the overlaying process √√ [Concept] (1 x 2) (2)

3.3.2 Maps have different scales √√
Different map projections are used on maps √√
Different geo-referenced maps are used √√
[Any ONE] (1 x 2) (2)

3.3.3 A summary of integrated data is produced which makes it easier to analyse data √√ (1 x 2) (2)

3.4 A storage system with linked tables √√
OR
Data is stored in tables which are linked to other tables √√
[Concept] (1 x 2) (2)

3.5 Correct distortions √√
Sharpen definition √√
Ensure colour consistency√√
Correct latitude and longitude registration √√
Makes data more manageable √√ [Any TWO] (1 x 2) (2)
[20]

SESSION 11

TOPICS: CLIMATOLOGY, GEOMORPHOLOGY AND MAPWORK CONSOLIDATION

Learner Note: In the prelim and final papers, the geomorphology section is equally mixed with climatology in the first two questions in Section A. You really need to know your work well to get good marks for section A in the final exam. You must also be able to apply your knowledge as there are some interpretation questions where you also need to understand the processes involved in geomorphology and climatology. These applications also apply to the mapwork interpretation. You must put in a lot of effort to get to know this part of the work well. You must know the facts and you will not get marks for vague answers. Question 3 is specifically directed at testing your calculation skills.

SECTION A: TYPICAL EXAM QUESTIONS

QUESTION 1: 40 minutes 60 marks

(Source: NCS Feb/March 2009 and other past papers)

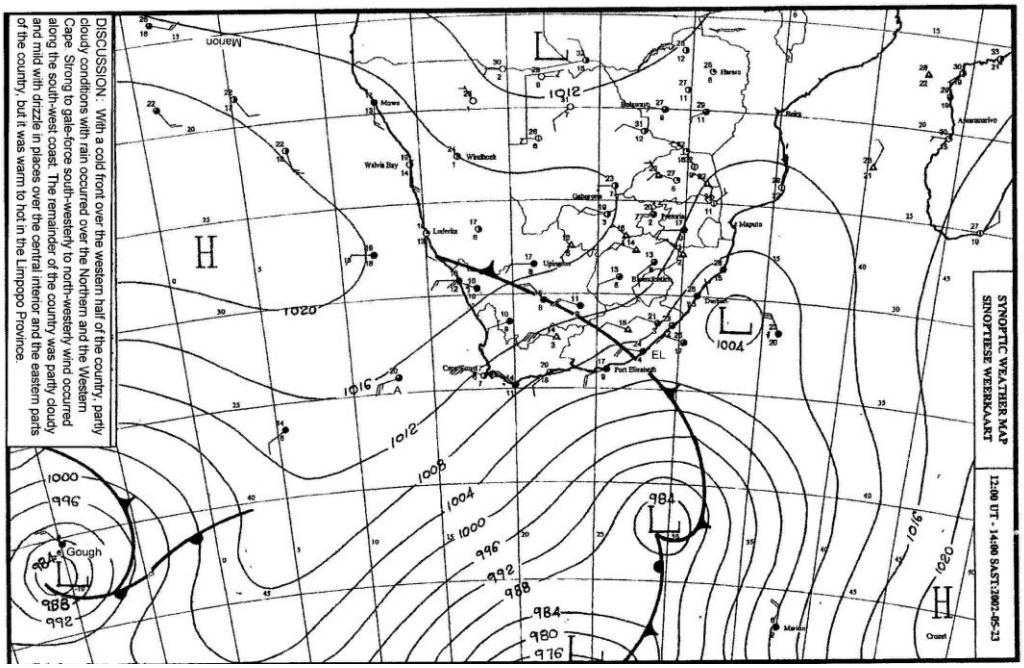
1.2 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (1.1.1 – 1.1.5).

1.1.1 The anabatic winds blow during the daytime.
1.1.2 The katabatic winds are also known as mountain winds.
1.1.3 The downward flow of wind in a valley is known as anabatic air flow.
1.1.4 These katabatic winds only occur during cloudy nights.
1.1.5 The heat loss from the earth's surface is as a result of terrestrial radiation

(5 x 2) (10)

1.2 Study the synoptic weather chart on the following page (Figure 1.2). Answer the questions that follow.

Figure 1.2



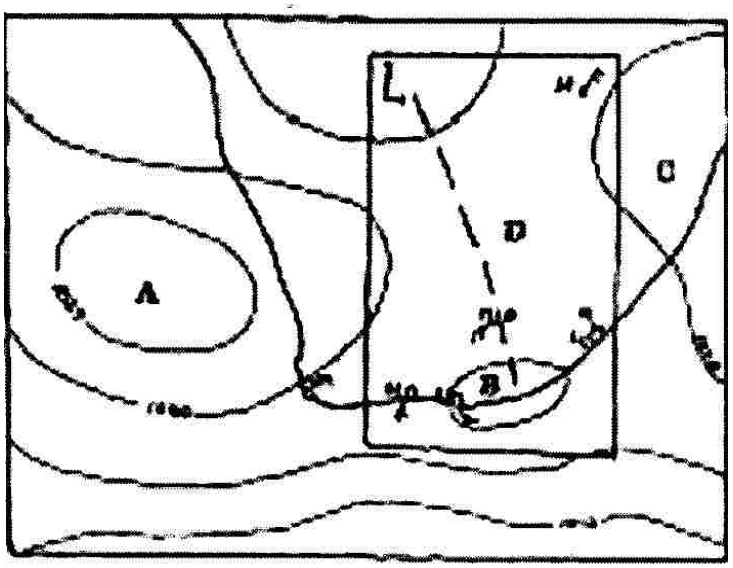
1.2.1 Describe and account for the wind at the weather station marked A. (5 x 2) (10)

1.2.2 What is the dominant weather system depicted on this synoptic chart? (1 x 2) (2)

1.2.3 Compare the weather stations at Port Elizabeth and East London. What are the differences between the two stations? (6 x 1) (6)

1.3 Figure 1.3 depicts a typical South African weather patterns.

Figure 1.3



1.3.1 Name the weather phenomena shown in Figure 1.3. (1 x 2) (2)
1.3.2 During which season do you expect to experience this pattern? (1 x 2) (2)
1.3.3 Explain how this feature is formed. (3 x 2) (6)
1.3.4 What name is given to the band of low pressure that extends across the South African interior along which line thunderstorms develop? (1 x 2) (2)
1.3.5 Do line thunderstorms develop on the eastern or western side of the band of low pressure mentioned in QUESTION 1.3.4? (1 x 2) (2)

1.4 The table below indicates the smoke concentration at several South African cities. Answer the following questions:

URBAN AREA	MONTHLY POLLUTION mg/m³	
	SUMMER	WINTER
Johannesburg (central)	0,08	0,195
Johannesburg (suburbs)	0,02	0,08
Pretoria	0,05	0,165
Durban	0,05	0,14
Cape Town	0,035	0,125
East London	0,05	0,125

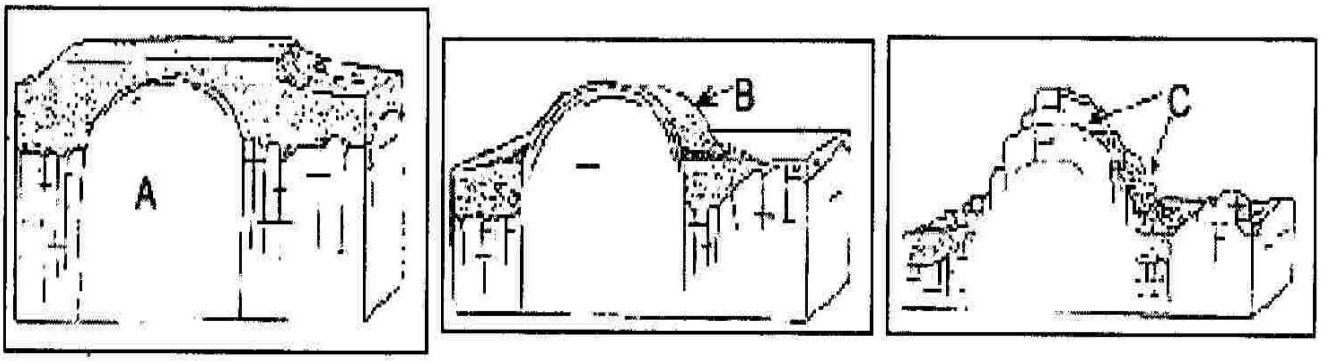
1.4.1 In which urban area in the RSA does one find:
(a) the highest smoke concentration? (1 x 2) (2)
(b) the lowest smoke concentration? (1 x 2) (2)
1.4.2 Explain the differences in smoke concentration in your answer to 1.4.1(a) and (b) by referring to the relationship between smoke concentration and the occurrence of a heat island. (3 x 2) (6)
1.4.3 Explain the following statement:
"*There is a marked difference between the smoke concentration of all urban areas in the RSA during the summer and winter months.*" (4 x 2) (8)
[60]

QUESTION 2: 30 minutes 52 marks *(Source: NCS Feb/March 2009 and various previous papers)*

2.1 Provide suitable definitions for the following:
2.1.1 Abstraction
2.1.2 Incised river
2.1.3 Talus
2.1.4 Soil creep
2.1.5 Slip-off slope (5 x 2) (10)

2.2 Study the diagrams below and answer the questions that follow:

Figure 2.2



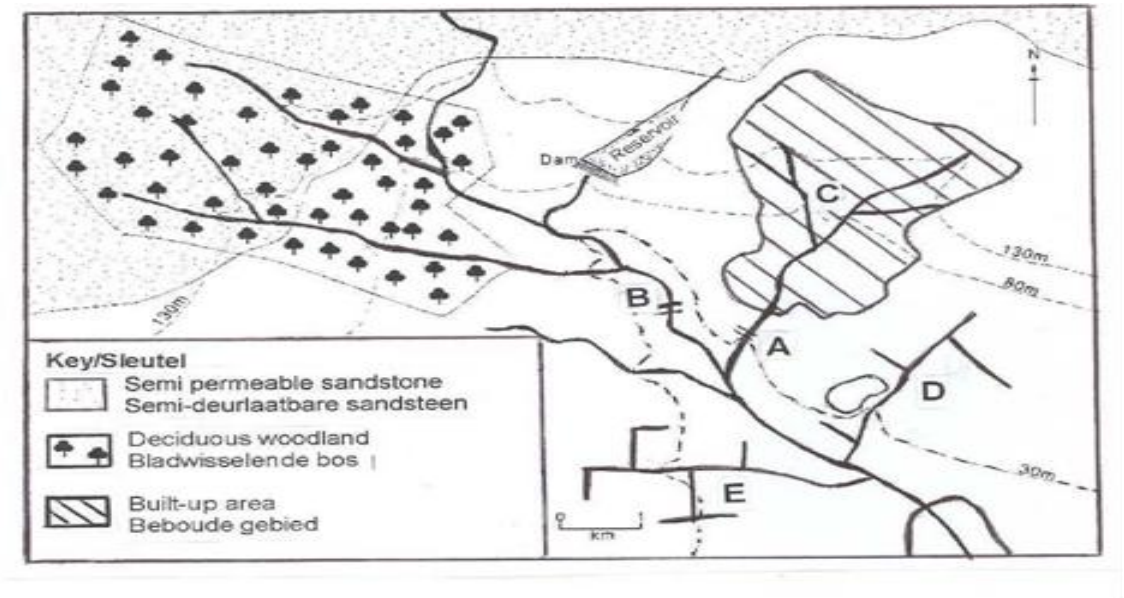
2.2.1 With what type of underlying geological structure and rock are A, B and C associated? (2 x 2) (4)

2.2.2 Identify the three landforms indicated by A, B and C respectively. (3 x 2) (6)

2.2.3 Identify ONE factor that influences the infiltration of water. (1 x 2) (2)

2.3 Study FIGURE 2.3 based on fluvial processes and drainage basins. After heavy rainfall in this drainage basin, the river will not reach its discharge peak immediately. This difference in time between the rainfall peak and the discharge peak is known as the lag time.

Figure 2.3



2.3.1 Identify the drainage patterns at D and E respectively. (2 x 2) (4)

2.3.2 Give ONE example of a natural feature that will restrict the river's discharge. (1 x 2) (2)

2.3.3 Give ONE example of a man-made feature that will restrict the river's discharge. (1 x 2) (2)

2.3.4 Suggest TWO positive effects that the deciduous woodland (forest) is likely to have on the catchment area. (2 x 2) (4)

2.3.5 Explain why there is a lag time between peak rainfall and peak discharge. (2 x 2) (4)

2.3.6 Where, at station A or station B, will the lag time be longer? (1 x 2) (2)

2.3.7 Explain your answer to QUESTION 2.3.6. (1 x 2) (2)

2.4 Rocks have different types of strata which give rise to unique landforms. Use FIGURE 2.4 to observe some of these landforms and answer the questions that follow.

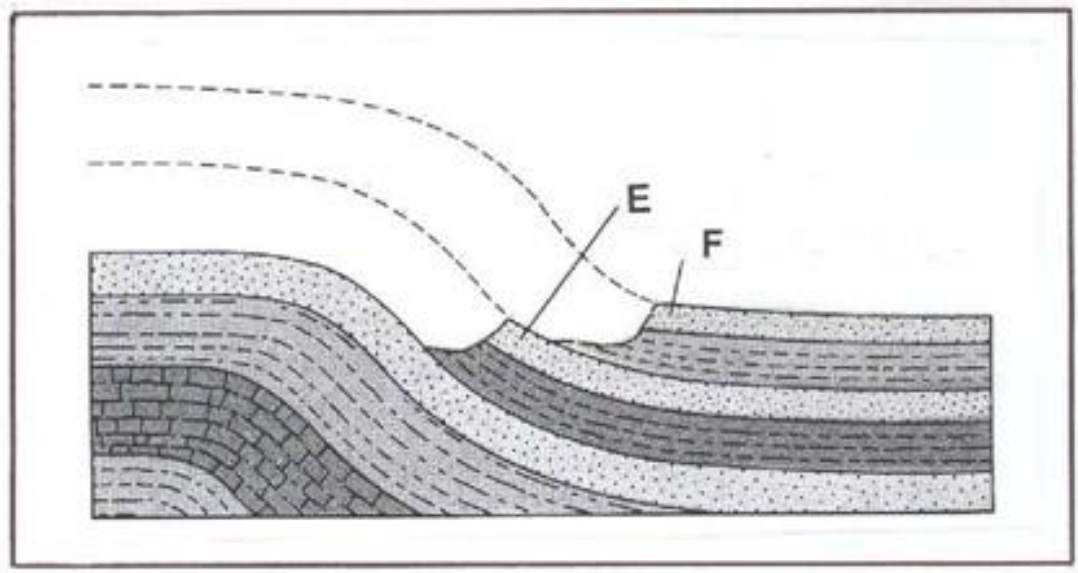
2.4.1 Identify the features (landforms) labelled **E** and **F**. (2 x 2) (4)

2.4.2 Give ONE difference between feature (landform) **E** and **F**. (1 x 2) (2)

2.4.3 Of what value is this landscape to man? Give TWO reasons. (2 x 2) (4)

[52]

Figure 2.4

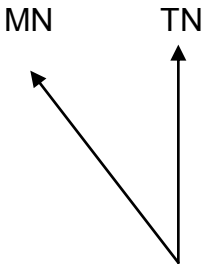


QUESTION 3 20 minutes 20 marks

(Source: Adapted exercise Senior Geography Grade 12)

This question is aimed at testing your calculation capabilities in mapwork. Most learners lose the majority of their marks in the calculation section of the mapwork paper (Paper 2).

Refer to the 1: 50 000 topographical map of Harrismith, and answer the questions that follow:



The mean magnetic declination is 22º48'W of true north (July 2002)
Mean annual change 12'E

3.1 Calculate the straight line distance from A (D2) to Δ299 (D3), in km. (2)

3.2 Determine the bearing from Ⓔ (A4) to •1747(E3). (2)

3.3. Determine the current magnetic bearing from Ⓔ (A4) to •1747 (E3). Show all calculations. (8)

3.4 Calculate the area of the map, in km². Show all calculations. (5)

3.5 What is the gradient from •1721(B4) to Δ299 (D3). (3)

[20]

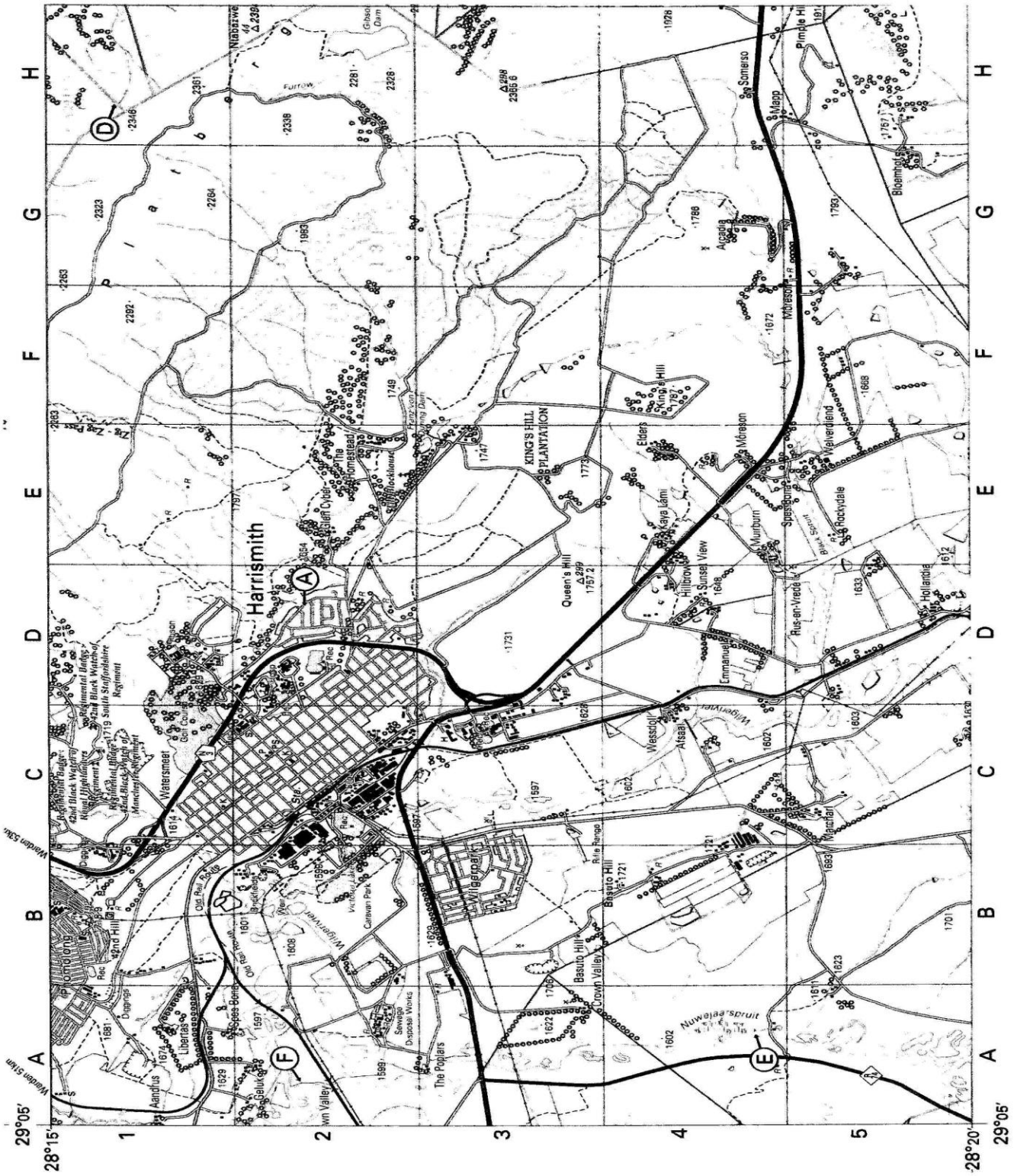


Plate 1 1 : 50 000 topographical HARRISMITH

SECTION B: HOMEWORK

QUESTION 1: 30 minutes 40 marks *(Source: NCS grade 12 November 2010 and other previous papers)*

1.1 Choose the correct alternative. Write only the question number and letter:

1.1.1 The movement of air towards a low pressure is called:

A divergence
B adiabatic
C anabatic
D convergence

1.1.2 The atmospheric cell found on either side of the equator is the:

A Ferrel cell
B mid-latitude cell
C tropical cyclone
D Hadley cell

1.1.3 The ITCZ is the convergence of:

A polar easterlies
B westerlies
C tropical westerlies
D tropical easterlies

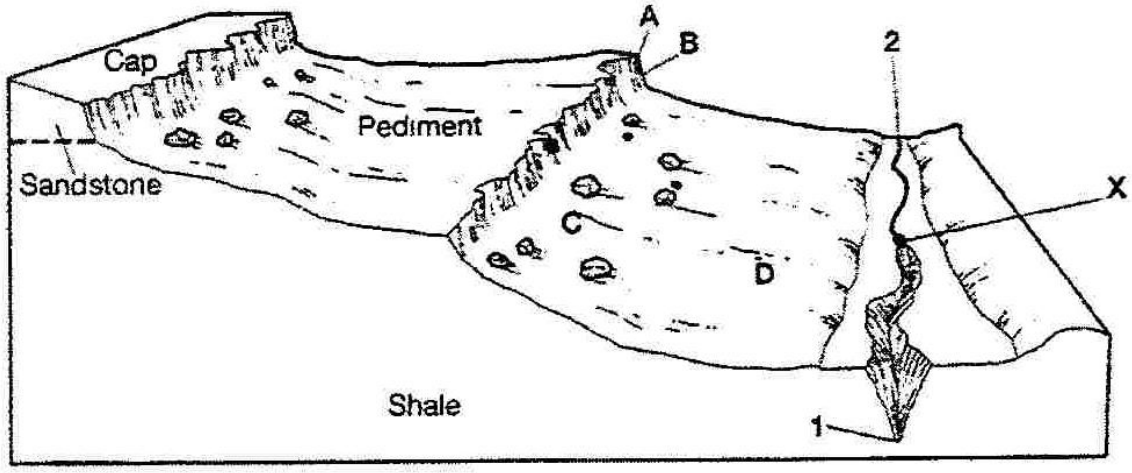
1.1.4 Winds that converge at the polar front are:

A westerlies and tropical easterlies
B polar easterlies and westerlies
C polar westerlies and easterlies
D polar easterlies and tropical westerlies

1.1.5 The anticlockwise change in direction of wind with the passing of a mid-latitude cyclone over Cape Town is called:

A backing
B veering
C converging
D rotating (5 x 2) (10)

1.2 Refer to the diagram below and answer the questions that follow:



1.2.1 Name the slope forms A, B, C and D respectively. (4 x 1) (4)

1.2.2 Give ONE characteristic of the slope form at C. (1 x 2) (2)
1.2.3 Name the mass movement likely to occur at B. (1 x 2) (2)
1.2.4 A knickpoint waterfall is located at X.
(a) Draw a long profile from 1 to 2. (2 x 1) (2)
(b) Explain why a knickpoint waterfall would have formed. (3 x 2) (6)

1.3 Write down the number of the question and the correct answer alongside.

1.3.1 Anabatic winds are
A Cool winds that sink down the valley sides during the night
B Warm winds that sink down the valley sides during the day
C Warm winds that rise up the valley sides during the day
D Cool winds that rise up the valley sides during the day

1.3.2 Urban areas generally have
A higher precipitation, gusty winds, higher temperatures
B lower precipitation, gusty winds, higher temperatures
C higher precipitation, gusty winds, lower temperatures
D higher precipitation, gentle winds, lower temperatures

1.3.3 The tropical cell of general circulation of the atmosphere occurs between
A 60º - 90º north and south of the equator
B 30 º - 60 º north and south of the equator
C 0 º - 30 º north and south of the equator
D 0 º- 40 º north and south of the equator

1.3.4 The warmest slopes in the northern hemisphere are the
A north slopes
B south-facing slopes
C south slopes
D north-facing slopes

1.3.5 The ITCZ
- A brings rain to southern Africa in winter
- B is the inter-tropical convergence zone
- C is associated with frontal rain
- D is continuous in tropical areas

1.3.6 The instrument used to measure atmospheric temperature is:
- A barometer
- B thermometer
- C hydrograph
- D anemometer

1.3.7 The instrument used to measure wind speed is:
- A thermometer
- B isohyet
- C contour
- D anemometer (7 x 2) (14)

[40]

QUESTION 2: 30 minutes 50 marks

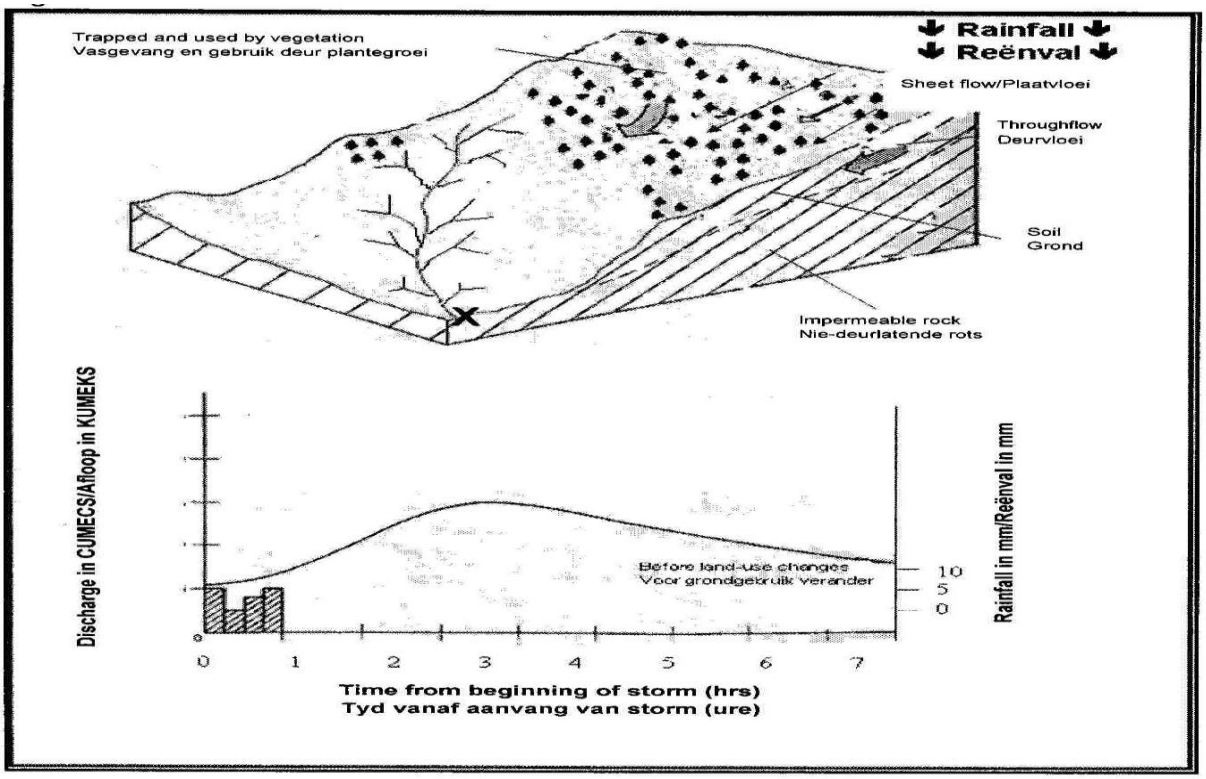
(Source: NCS Gr 12 November 2010 and various other past papers)

2.1 Provide the correct terminology for:

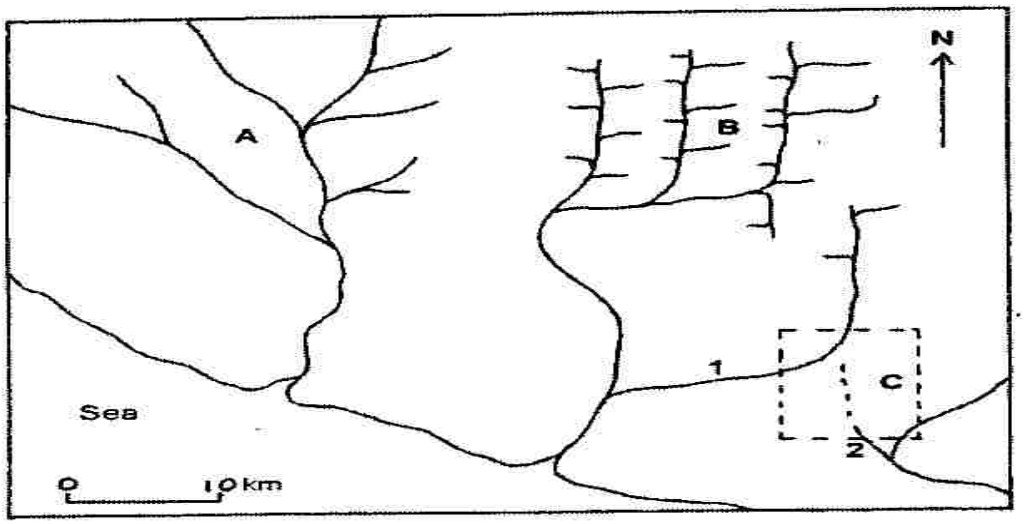
2.1.1 The process by which the entire watershed moves backwards.
2.1.2 The angle of rock fragments that collect on the talus slope.
2.1.3 The process by which intrusive igneous rock is weakened.
2.1.4 A river that obtains its water from upstream.
2.1.5 Rock that allows water to move easily through it. (5 x 2) (10)

2.2 Refer to FIGURE 2.2 which shows a river system and its flow hydrograph.
2.2.1 What is a *river system*? (1 x 2) (2)
2.2.2 Explain how the following factors influence the amount of water (discharge) that flows in the stream:
(a) Impermeable bedrock (1)
(b) Dense vegetation (1)
2.2.3 Determine the stream order at point **X** where the stream flows out of the drainage basin. (1 x 2) (2)
2.2.4 What evidence suggests that this is a superimposed stream? (1)
2.2.5 State the lag time on the flow hydrograph. (1)
2.2.6 The proposed development of a new urban settlement along the stream would influence the flow characteristics of the stream.
Write a single paragraph (no longer than 12 lines) describing, with reasons, how the proposed urban development along the stream will change the lag time and the flood peak indicated on the flow hydrograph. (6 x 2) (12)

Figure 2.2



2.3 Refer to the following diagram and answer the questions that follow:



2.3.1 Identify the stream patterns at A and B. (2 x 2) (4)

2.3.2 Suggest the underlying geology for each of the respective stream patterns. (2 x 2) (4)

2.3.3 (a) what process is occuring in block C? (1 x 2) (2)

(b) re-draw block C on your answer page and label all the relevant geographical features. (4 x 2) (8)

2.3.4 What is the highest stream order in river A? (1 x 2) (2)

[50]

SECTION C: SOLUTIONS AND HINTS TO SECTION A

QUESTION 1

1.1

1.1.1 True √√
1.1.2 True √√
1.1.3 False √√
1.1.4 False √√
1.1.5 True √√ (5 x 2) 10)

1.2

1.2.1 SE wind√√
10 knots√√
Clockwise rotation around HP in Southern hemisphere√√
Wind is geostrophic and parallel to isobars√√
Wind is weak as PGF is small (Isobars far apart) √√ (5 x 2) (10)

1.2.2 Cold front (Mid-latitude cyclone) √√ (1 x 2) (2)

1.2.3 PE – Temperature 17ºC√
Wind direction SW√
Wind speed 20 knots√
EL – Temperature 24ºC
Wind direction WNW√
Wind speed 20 knots√ (6 x 1) (6)

1.3

1.3.1 Line thunderstorms√√ (1 x 2) (2)

1.3.2 Summer√√ (1 x 2) (2)

1.3.3 South Indian HP feeds in warm moist air√√
South Atlantic HP feeds in cold dry air√√
The two air masses converge over the interior, where the warm air rises causing rain to occur√√ (3 x 2) (6)

1.3.4 Moisture front / Trough line√√ (1 x 2) (2)

1.3.5 Eastern√√ (1 x 2) (2)

1.4

1.4.1 (a) Johannesburg Central√√ (1 x 2) (2)
(b) Johannesburg Suburbs√√ (1 x 2) (2)

1.4.2 (a) The smoke concentration is greater in cities√as there is more pollution created√ here especially by cars√
(b) The heat island will coincide √ with the area of highest√ smoke concentration√ (3 x 2) (6)

1.4.3 In winter more energy√ is used for heating and lighting. More coal in particular is burnt√, but also other fuels such as wood. The HP is dominant√ in winter which pushes the inversion lower causing a higher concentration in pollution levels√ (4 x 2) (8)

[60]

QUESTION 2

2.1

2.1.1 The entire watershed moves backward√√

2.1.2 A river that erodes into its own bed causing a canyon√√

2.1.3 Rocks that have fallen off the free face and are broken fragments of rock are called talus√√

2.1.4 A very slow form of mass movement caused by expansion and contraction. Occurs on the crest√√

2.1.5 This is the inner bank of a meander√√ (5 x 2) (10)

2.2

2.2.1 Intrusive Igneous√√ volcanic formations√√ (2 x 2) (4)

2.2.2 A = Batholith√√ B= Dome√√ C= Tor√√ (3 x 2) (6)

2.2.3 Any ONE
Level of water table√√
Intensity of rainfall√√
Vegetation cover√√
Steepness of topography√√
Hardness of rock√√ (1 x 2) (2)

2.3

2.3.1 D – Trellis √√
E – Angular/Rectangular √√ (2 x 2) (4)

2.3.2 Deciduous woodland √√
Semi-permeable sandstone√√ [Any ONE] (1 x 2) (2)

2.3.3 Dam/Reservoir √√ (1 x 2) (2)

2.3.4 Increases infiltration √√
Groundwater content increases √√
Increase in base flow to maintain river run-off √√
Decrease in evaporation to increase availability of water √√
Decreases run-off and soil erosion √√ [Any TWO] (2 x 2) (4)

2.3.5 First rainfall infiltrates the soil and does not contribute to run-off√√
Rainfall first forms sheet flow before it reaches a stream √√ (2 x 2) (4)

2.3.6 B√√ (1 x 2) (2)

2.3.7 Woodland will retard flow of water √√
More water will infiltrate √√
Will take longer for water to reachmain stream at B √√
Built up area will reduce infiltration √√
Run-off will reach main stream at A quicker √√
More tributaries run into stream B √√ [Any ONE] (1 x 2) (2)

2.4

2.4.1 E – Homoclinal ridge / Cuesta √√
F – Mesa √√ (2 x 2) (4)

2.4.2 E tilted more in relation to the earth's surface √√
E has two steep slopes √√
F has one steep and one gentle slope √√ [Any ONE] (1 x 2) (2)

2.4.3 A Of strategic importance – defensibility √√

Soft layers between ridges form fertile soil suitable for agriculture √√
If formed around basin shaped features it could trap ground water √√
Steep slopes afforested √√ [Any TWO. Accept other] (2 x 2) (4)

[52]

QUESTION 3

3.1 Distance = 4,9cm√
4,9cm x 0,5
2,45km√ (2)

3.2 69º√√ (2)

3.3 MB = TB + MD√
TB 69º√
MD in 2002 was 22º48'W
Annual change is 12'E√
Change in years = 2011 – 2002
= 9 years√
Change in MD = 9 x 12'
= 108' (1º48') √
MD in 2011 = 22º 48' - 1º 48'
= 21º W of TN√
MB = TB + MD
= 69º + 21º√
= 90º√ (8)

3.4 Area = L x B √
12,9cm x 10,9cm√
(12,9 x 0,5) x (10.9 x 0,5) √
6,45km x 5,45km√
35,64km²√ (5)

3.5 Gradient = $\frac{VI}{HE}$

= $\frac{1757,2 – 1721m}{6,6cm}$√

= $\frac{36,2}{6,6 \times 500}$

= $\frac{36,2 \div 36,2}{3300 \div 36,2}$ √

= $\frac{1}{91,16}$

= 1: 91,16 √ (3)

[20]