



FACULTY OF SCIENCE

DEPARTMENT OF GEOLOGY

MODULE CODE	GLG3A10
MODULE NAME	Sedimentology and Stratigraphy
CAMPUS	APK
EXAM	June 2014 Supplementary

Date	June 2014 (Supplementary)
Assessor(S)	Professor Bruce Cairncross & Dr Michiel de Kock
Internal Moderator	
External Moderator	Dr Zubair Jinnah University of the Witwatersrand
Duration	3 hours
Marks	180

Number of pages	6
Instructions	Answer all the questions Answer Section A and Section B IN SEPARATE ANSWER BOOKS

SECTION A

Question 1

(21)

Answer the multiple choice questions on the question paper by circling one answer (**1 mark each**) that is the **most correct**. Circle the letter, not the words. Where you have to give a reason for your answer, write the answer with the question number, in your answer book.

1(a). Which one of the following statements is true?

- A. High porosity always produces high permeability
- B. Water is not important in the weathering process
- C. Sandstones are mainly composed of feldspars
- D. Terrigenous clastic sediment can contain biogenic grains
- E. Evaporites are not sedimentary rocks

GIVE REASONS FOR YOUR ANSWER.

(5)

1(b). Sedimentary rocks are classified by:

- A. Texture and composition
- B. Compaction and cementation
- C. Depositional environment and thickness
- D. Age and color

1(c). What does not belong in the list below?

- A. Chlorite
- B. Glauconite
- C. Bentonite
- D. Biotite
- E. Illite
- F. C+D+A
- G. B+E
- H. D+C

1(d). This fine-grained laminated sedimentary rock is composed of clay minerals and silt sized-particles

- A. Claystone
- B. Shale
- C. Sandstone
- D. Siltstone
- E. Mudstone

GIVE REASONS FOR YOUR ANSWER.

(5)

1(e). Which of the following minerals would NOT commonly be found in the beach sands of KwaZulu-Natal?

- A. Quartz
- B. Rutile
- C. Garnet
- D. Olivine
- E. Ilmenite

1(f). According to Nichols, which of the following components constitute grains in allochthonous sedimentary rocks?

- A. Volcaniclastic ash
- B. Carbonate oolite grains
- C. Terrigenous sediment
- D. Evaporites
- E. A+B+C
- F. B+D
- G. All of the above

GIVE REASONS FOR YOUR ANSWER

(5)

Question 2

(23)

You are presented with the following five sedimentary rocks. Complete the table below WRITE YOUR ANSWERS ON THIS TABLE, NOT IN THE ANSWER BOOK!!!

Rock Name ➡	Arkose	Salt Pan deposit	Greywacke	Black, carbonaceous shale	Ortho quartz arenite
List the minerals / grains present					
List the matrix present (<u>if applicable</u>)					
Is the rock allochthonous or autochthonous?					

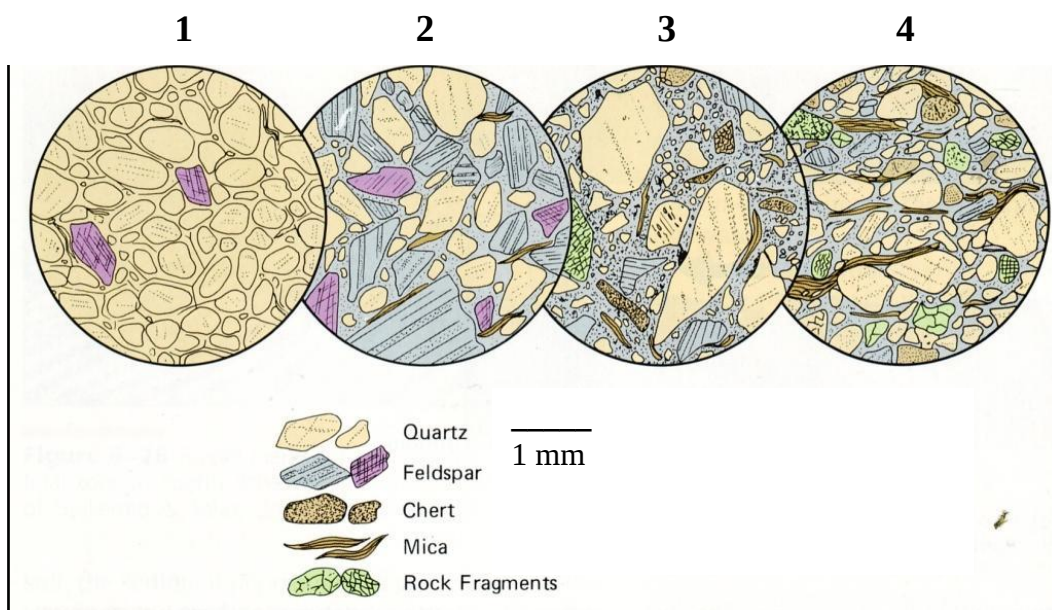
Question 3

(27)

Write the answers in the Table provided, not your answer book.

For **EACH** sample below, numbered 1 to 4:

- Describe the sorting of each rock (4)
- Describe the textural / physical maturity of each rock (4)
- Describe the chemical / mineralogical maturity of each rock (4)
- Name each rock (5)
- What type of weathering, transport and deposition would have acted on the source rocks to produce the sediment that ultimately formed each of these four rocks? (10)



Sample Number	1	2	3	4
Sorting				
Phys maturity				
Chem maturity				
Name				
Weathering: Type of transport: Type of deposition:				

Question 4

(19)

Listed below are various rock types. You are required to classify these into the table provided. Each rock name has a letter of the alphabet next to it. WRITE THE CORRESPONDING LETTER FOR EACH SAMPLE IN THE TABLE, NOT THE ROCK NAME. The first one has been done for you, as an example. Write in the table on this question paper, NOT IN YOUR ANSWER BOOK.

	Allocthonous Clastic	Allocthonous Carbonate	Allochthonous volcaniclastic	Autocthonous Inorganic	Autocthonous Organic	Secondary Diagenetic
A=shale	A					
B = lignite						
C= diatomaceous chert						
D= greywacke						
E= ignimbrite						
F=boundstone						
G=banded-iron formation						
H=lapillistone						
I = sapropelite						
J= marl						
K=arkose						
L=anhydrite						
M= grainstone						
N=lithic arenite						
O=polymictic diamictite						
P= secondary chert						
Q=oolitic limestone						
R=Coal						
S=Carbonaceous mudstone						
T = Lahar						

SECTION B

Question 5

(35 marks)

- 1.1 What is facies, and how is it used to determine ancient processes or conditions? (10 marks)
- 1.2 Why might some sedimentologists consider Walther's law the most important stratigraphic principle? (15 marks)
- 1.3 Explain the concepts of transgression and regression. (4 marks)
- 1.4 What does Walther's law tell us about the age relationships between facies. Use a sketch of a prograding alluvial fan to indicate this relationship. (6 marks)

Question 6

(30 marks)

Compare and contrast braided and meandering fluvial systems, both in the modern and in the rock record.

Question 7

(25 marks)

How do deltas form and in what settings are they best developed? (5 marks)

How does the relative importance of tides versus waves influence the types of bedforms and sedimentary structures, composition, as well as overall succession produced by deltas? (20 marks)