FACULTY	Agriculture, Engineering and Natural Sciences		
DEPARTMENT	Geosciences		
SUBJECT	Fundamentals of Mineralogy and Petrology		
SUBJECT CODE	S3611GY		
PAPER	Paper 1 Combined Theory & Practical		
DATE	June 2026		
DURATION	180 min (3 hours)	**MARKS**	100

1st OPPORTUNITY EXAMINATION NEW CURRICULUM

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Internal Moderator: Dr. E. Shalimba

This question paper consists of 5 pages (including this one)

Instructions

- Closed book examination.
- Answer all questions.
- Use a calculator where necessary.
- Recommendation: First read all questions before you answer.

UNIVERSITY OF NAMIBIA EXAMINATIONS

Part 1: Theory

Question 1: [10 marks]

Define the following terms:

(a) Electronegativity [2 marks]

(b) Streak [2 marks]

(c) Mineral [2 marks]

(d) Diagenesis [2 marks]

(e) Metamorphism [2 marks]

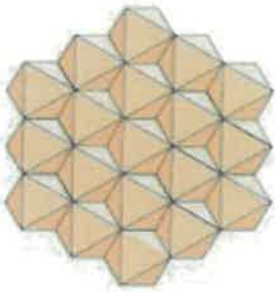
Question 2: [15 marks]

(a) Briefly explain the concept of polymorphism. [2 marks]

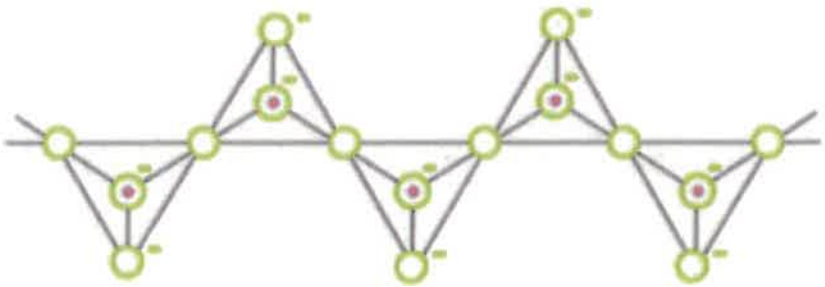
(b) State and describe the two types of polymorphic transitions. [6 marks]

(c) State examples of $CaCO_3$ and C polymorphs. [2 marks]

(d) According to Pauling s 3rd rule, which structure below (Fig. 1.1) is relatively stable? Justify your answer. [5 marks]



X.



Y.

Fig. 1.1. Mineral structures

Question 3: [16 marks]

(a) What are the principal categories of sedimentary rocks? What characterizes each? [6 marks]

(b) Name and describe four marine environments where sedimentary rocks are deposited. [10 marks]

Question 4: [17 marks]

(a) Describe the following metamorphic rocks: Marble, Serpentinite, Phyllite, Schist, Gneiss. [10 marks]

(b) Draw a well labelled metamorphic facies diagram for collision metamorphism. [7 marks]

Question 5: [12 marks]

(a) How does felsic minerals differ from mafic minerals? Which minerals on Bowen's Series are mafic? Which are felsic? [6 marks]

(b) Other than the externally imposed cooling rate, what are the three principal rates that govern rock

texture? [3 marks]

(c) Explain how porphyritic texture is most likely to develop. [3 marks]

Part 2: Practical

Question 6 [15 marks]

Using the Q-A-P-F classification of igneous rocks in Fg. 1.3, select appropriate names for: (15 marks)

a. Fine-grained, 45% plagioclase (An25), 8% alkali feldspar, 30% quartz, 5% hornblende, 8% biotite and 4% opaques;
b. Coarse-grained, 40% plagioclase, 28% alkali feldspar, 12% quartz, 8% hornblende, 8% biotite and 4% opaques;
c. Fine-grained, 29% sodic plagioclase, 40% alkali feldspar, 15% nepheline, 12% aegrine-augite and 4% opaques by volume.

Question 7 [15 marks]

Answer the following questions with respect to Fig. 1.2 below:

a. In your own words describe the crystallization sequence of components **A** and **B** from an initial melt of composition M. (10 Marks)
b. What is the relative amount of component **A** in the final crystalline rock? (5 Marks)

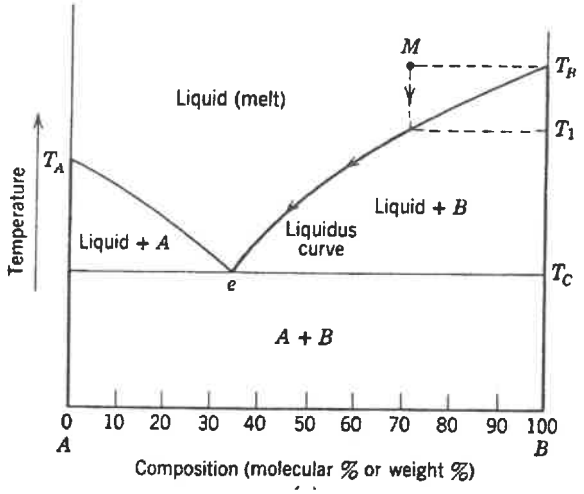


Fig. 1.2: A hypothetical two component system with no solid solution.

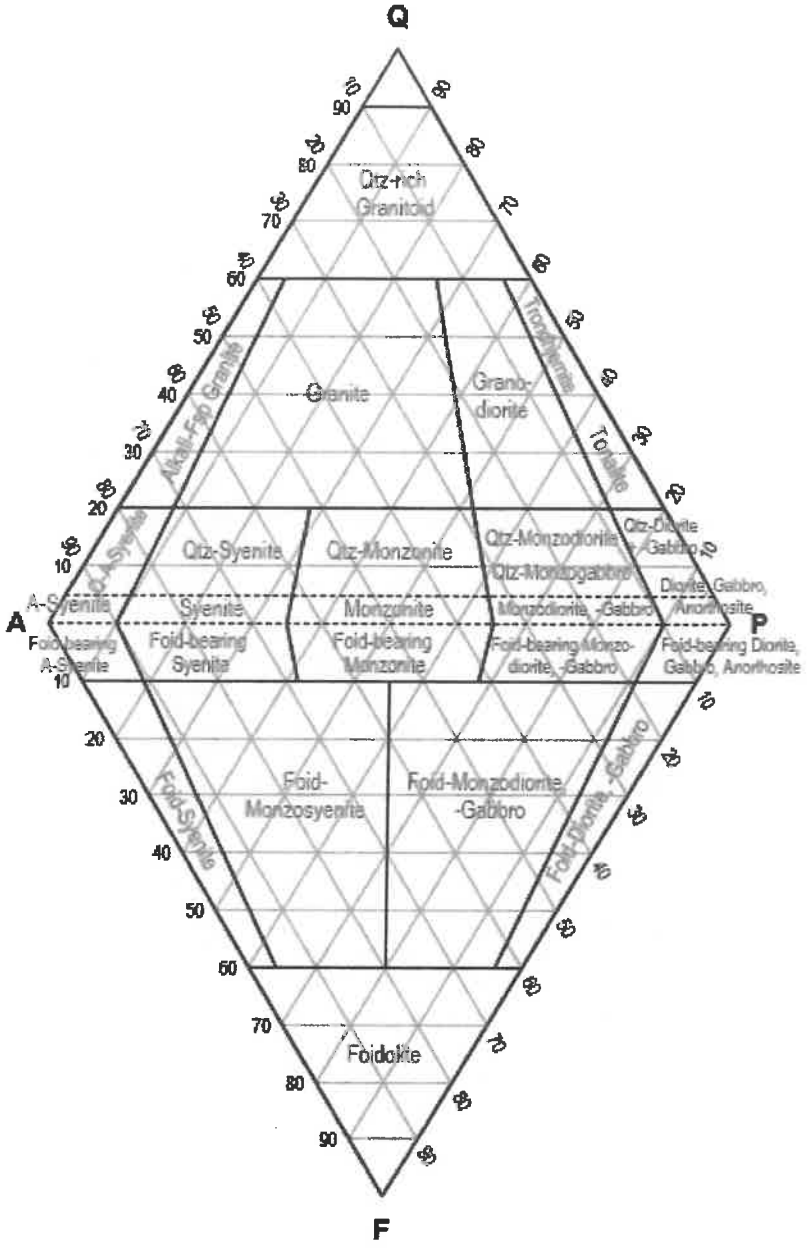


Fig. 1.3

END OF EXAMINATION