



**FACULTY OF SCIENCE**

**FAKULTEIT NATUURWETENSKAPPE**

**DEPARTMENT OF GEOLOGY**

**MODULE      GLG2A02 METAMORPHIC ROCKS**

**CAMPUS      APK**

**EXAM          JULY 2019**

**DATE: .././2019**

**SESSION: ....**

**ASSESSOR(S)**

**INTERNAL MODERATOR**

**Prof. H. Mouri**

**EXTERNAL MODERATOR**

**Dr T. Owen-Smith**

**DURATION:      3 HOURS**

**MARKS    100**

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**NUMBER OF PAGES:**

**2 PAGES**

### **Question 1 [25%]**

Discuss the physical parameters that control metamorphism and how they affect rocks in order to change them into metamorphic rocks. Illustrate your answers with examples and sketches whenever possible.

### **Question 2 [20%]**

What is a geothermal gradient and explain how does it differ geological settings

### **Question 3 [30%]**

If a rock of shale composition is subjected to metamorphism at a depth of 19 km under a **normal geothermal gradient**:

- What is the name of this type of metamorphism?
- What would be the P–T conditions? Explain how you obtained these values.
- What would be the facies and the grade of metamorphism under these conditions? Illustrate the position of this rock on a P–T facies diagram.
- Give the index mineral and other possible minerals (with their chemical formulae) that you would expect to find in the resulting metamorphic rock.
- If such a rock is subjected to much higher temperature (up to 800 °C), what would happen to it? Explain your answer

### **Question 4 [25%]**

- Which type of metamorphism takes place at the boundary between the crust and mantle and which type of rock is formed?
- List two minerals with their chemical compositions that are typical of this rock.
- Show where this type of metamorphism is located on a P–T diagram.
- What would be the possible parent rock for such a metamorphic rock? Explain your answer.