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#### MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

FACULTY OF ENGINEERING

**DEPARTMENT: MINING AND MINERAL PROCESSING ENGINEERING**

**MODULE: ENGINEERING GEOLOGY**

**CODE: HMIE 512**

### SESSIONAL EXAMINATIONS

**JUNE 2023**

**DURATION: 3 HOURS**

**EXAMINER: T.F.K. NGOROYEMOTO**

## INSTRUCTIONS

1. *Answer* ***Any five (5)*** *questions.*
2. *Each question carries 20 marks*
3. *Total marks 100*

**QUESTION 1**

1. Discuss reasons for high degrees of uncertainty in geological models. **[2]**
2. The Bvumba Road is characterized by rock falls which can potentially result in fatalities and disruption in traffic flow. You have been recruited the Project Engineering Geologist. Evaluate:
3. Mitigation strategies that can be employed **[6]**
4. How you will identify the causative factors of the rock falls **[12]**

**QUESTION 3**

1. Discuss important factors that influence site response **[3]**
2. Outline the objectives of engineering geology investigations **[5]**
3. Due to population growth, there is need to construct a new dam in Mutare. Evaluate the process that needs to be followed to ensure safe design and longevity from an Engineering Geology perspective. **[12]**

**QUESTION 3**

1. Discuss why grouting is important in dam construction **[2]**
2. In local communities there is infrastructural damage that is related to subsidence and this has resulted in litigation to local governments by property owners:
3. Outline potential root causes of subsidence in residential and commercial areas **[6]**
4. Evaluate measures that can be employed to avoid costly litigation by local governments **[12]**

**QUESTION 4**

1. There is need to construct a new lecture block in an area with soft ground and settlement loading. What remedial action would you recommend **[2]**
2. Evaluate site effect parameters that can be established by the HVSR **[6]**
3. Discuss how geomorphology and geology influence the design of a dam **[12]**

**QUESTION 5**

1. Siltation is a major challenge in dams, outline measures that can be applied as mitigation measures **[2]**
2. Provide a sound justification on the importance of engineering geological investigations on projects **[4]**
3. Discuss the main applications of Horizontal to Vertical Spectral Ratio. **[4]**
4. Discuss the causative factors of dam disasters  **[10]**

**QUESTION 6**

1. Outline HVSR assumptions **[2]**
2. Cyclone Idah had devastating effects as it resulted in loss of life, environmental degradation as well as infrastructural damage through landslides. With reference to this disaster discuss:
3. Strategies that can be employed to avert from such disasters in future. **[5]**
4. The potential mechanisms that resulted in failure. **[6]**
5. Provide am outline on probable challenges that may be encountered on an engineering project **[7]**

**END OF QUESTION PAPER**

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