FACULTY OF SCIENCE & TECHNOLOGY

#### MIDLANDS STATE UNIVERSITY

**Mining and Mineral Processing Engineering Department**

**UNDERGROUND MINING**

**CODE: HMIE 216**

### SESSIONAL EXAMINATIONS

**December 2016**

**DURATION: 3 HOURS**

**EXAMINER: E Z MANDAZA**

## INSTRUCTIONS

1. *Answer* ***any four*** *questions*
2. *Each question carries 25 marks*
3. *Total marks 100*

**Question 1**

1. What is the role of a mining engineer in the determination of mineral reserves and resources? **[5]**
2. Explain the initiation and detonation of an explosive column within a blast hole showing how rock breakage occurs. **[10]**
3. Draw a fan of blast holes for 20 metre sublevel stoping of a 20 m wide stope with the drilling and blasting sub-level at 3 m by 3 m dimensions centred in the middle of the stope along strike. Show the uncharged portion of the fan drill holes for a blasting burden of 2 metres. **[10]**

**Question 2**

Detail the properties of an ore body that influence the design and choice of a suitable mining method. **[25]**

**Question 3**

A coal mine is using the room and pillar method with rooms and cross cuts 6 metre width driven on 27 metre centers. Entries and entry crosscuts are of the same dimensions. If no barrier pillars are left, calculate the percentage recovery with and without pillar extraction. **[25]**

**Question 4**

1. Provide a detailed illustration to show Sub-level open stoping with 60 metres wide open stopes, 10 metre rib pillars and 10 metre high crown pillars. Position suitable draw points for the above system **[10]**
2. Explain the development sequence for system in part a). **[5]**
3. What are the main orebody and country rock features and characteristics that favour block caving? **[5]**
4. Provide a stoping sequence for block caving operations **[5]**

**Question 5**

1. Platinum group mining on the Great Dyke has taken off following the introduction of mechanized room and pillar mining. Provide a detailed illustration to show room and pillar mining as practiced on the Great Dyke illustrating rock movement on the level and out of underground operations. **[10]**
2. Explain the development sequence for room and mining on the Great Dyke. **[5]**
3. Detail the controlling factors for pillar orientation on the Great Dyke and how they affect different platinum group mines on it. **[5]**
4. What have been the defining characteristics of platinum group mineral extraction on the Great Dyke that favour mining of deeper lying deposits than outcropping ore in this particular circumstance? At what typical depths does underground mining typical start at in these circumstances and what are the reasons behind this? **[5]**

**END OF PAPER**