FACULTY OF ENGINEERING AND ENVIRONMENT

DEPARTMENT OF MINING ENGINEERING

Mine Machinery, Materials Handling and Services

EMN 3108

Final Examination Paper

This examination paper consists of 4 pages

Time Allowed: **3 hours**

Total Marks: 100

Examiner's Name: Mr. T. Dombo

<u>INSTRUCTIONS</u>

1. **Answer all questions**
2. Each question carries 20 marks
3. Use of calculators is permissible

Additional Requirements

Calculator

<u>MARK ALLOCATION</u>

Question 1 to 5	Total 20 marks
Part Questions	As shown in each part question
Total Attainable	100 marks

Page 1 of 3

ANSWER ALL QUESTIONS

QUESTION 1

(a) You are assigned with the task of assisting Rock Technology to acquire dump trucks and wheel loaders for the planned production of 200 t/ hour at its newly acquired limestone quarry.   The density of the limestone is $1.54t/m^3$. Theoretical number of cycles per hour for the wheel loader is 51 while the bucket fill factor is 90%. Given additional information and specifications from Caterpillar handbook page below, which type of wheel loader and dump truck would you consider? **[10]**
CATERPILLAR HANDBOOK PAGE

Table one

Loader type	Capacity, m^3
980G	3
965G	2.85
962G	3.45

Table two

Dump truck type	Capacity, m^3
988D	17
969D	20
949D	21

(b) Define the following terms:
    i.   Bucket fill factor
    ii.   Swell factor
    iii.   Continuous excavator
    iv.   Cyclic excavator
    v.   Mechanical availability **[10]**

QUESTION 2

Reliability of a mining equipment is one of the important factors in mining industry. Define the underlined word, explain on the factors impacting on it and how to improve on it. **[20]**

QUESTION 3

(a) A conveyor belt with a length of 200 m and width of 2 m is transporting iron ore with a density of 3.0 kg/ m^3 from primary crusher to the mill. Calculate the volume per unit time of the belt if its speed is 5m/s. **[4]**

(b) Given that its idlers are inclined at 20°, calculate the new value for the volume per unit time of the conveyor. **[3]**

(c) Calculate the maximum mass which can be handled by the above conveyor belt. **[3]**

(d) Elaborate on the factors affecting belt sizing. [8]

(e) Discuss on the implication of overestimating density of the material laying on the conveyor belt **[2]**

QUESTION 4

(a) Explain the requirements for a conveyance rope selection **[5]**

(b) List the considerations when selecting a conveyance rope. **[3]**

(c) What is the function of the lubricant on rope dressing and which properties should exhibit that lubricant? **[7]**

(d) Define factors of safety for conveyance rope. **[5]**

QUESTION 5

(a) Discuss on the disadvantages of a Bucket Wheel Excavator. **[5]**

(b) Name five attributes of a scrapper. **[5]**

(c) Describe cases where you would choose continuous excavators over cyclic excavators. **[6]**

(d) Describe steps one would take in selecting cyclic excavators. **[4]**

END OF EXAMINATION