FACULTY OF ENGINEERING AND ENVIRONMENT

DEPARTMENT OF MINING ENGINEERING

COMPUTER APPLICATION IN MINING EXAMINATION

EMI 2202

Final Examination Paper

June 2020

This examination paper consists of 3 pages

Time Allowed: **4 hours**

Total Marks: 100

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INSTRUCTIONS

1.   Answer question one in **Section A** and **ANY 3** questions from **Section B**
2.   Question one carries 40 Marks and the remaining **questions** in **Section B** carriers **20 marks** each.
3.   Save your work into the examination folder with your registration number.
4.   No secondary storage devices to be used (physically plugged/ wireless plugged).

Additional Requirements
Desktop computer machines with **Surpac**, **AutoCAD, MATLAB & Project** application software's.
MARK ALLOCATION

Questions	Marks
Question 1	**40**
Question 2	**20**
Question 3	**20**
Question 4	**20**
Question 5	**20**
Total Attainable	**100**

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Question 1: Graphical Display using Computer Aided Design software's.

a) A customer service manager of *Engineering Firm* supplying drilling accessories to Mines has analysed 300 customer complaints from *Engineering Managers* received over the past year into eight categories, as shown in the categorical frequency table in Table Q1(a) below.

Table 1(a): Customer Complaints.

Code	Description	Count
1	Poor product knowledge.	26
2	Product options limited.	47
3	Internet sites frequently down.	12
4	Slow response times.	66
5	Unfriendly staff.	15
6	Non reply to queries.	22
7	Cost of services is excessive.	82
8	Payment Options Limited.	30

Construct a *pareto curve* of using the information given in the table above.   **[10 Marks]**

b) The mining engineer responsible for coal production generates a high level monthly plan as shown in table 1(b) in below.

  i)   Using duration days in table 1(b) Construct the critical path of the three Gantt chart using Microsoft Project.   **[8 Marks]**

  ii) Allocate resources and materials for the Coal Monthly plan.   **[4 Marks]**

  iii) Determine the total project cost.   **[2 Marks]**

  iv) Review and track the project midway through the month.   **[4 Marks]**

  v)   What is the revised completion date?   **[2 Marks]**

Table 1(b): *Resource Allocation*.

August Sub tasks	Duration (days)	Resources Allocation	Review
Drilling	3	David @ $100/hr; John @ $150/hr. Machine hire $30 000	100% Complete
Charging & Blasting	2	Peter @ $100/hr; John @ $150/hr. Explosives $90 000.	7 days Overrun.
Extraction & Hauling of Coal	26	Murray @ 100/hr; David @ $100/hr; John @ $150/hr. Contractors Cost @ $275 000	Moved forward to start on the18th of August due to fuel shortages.

c) Fig 1(c) cross section of the Surface mine blast design using AUTOCAD.

Figure 1(c): *Surface mine design of a bench*.
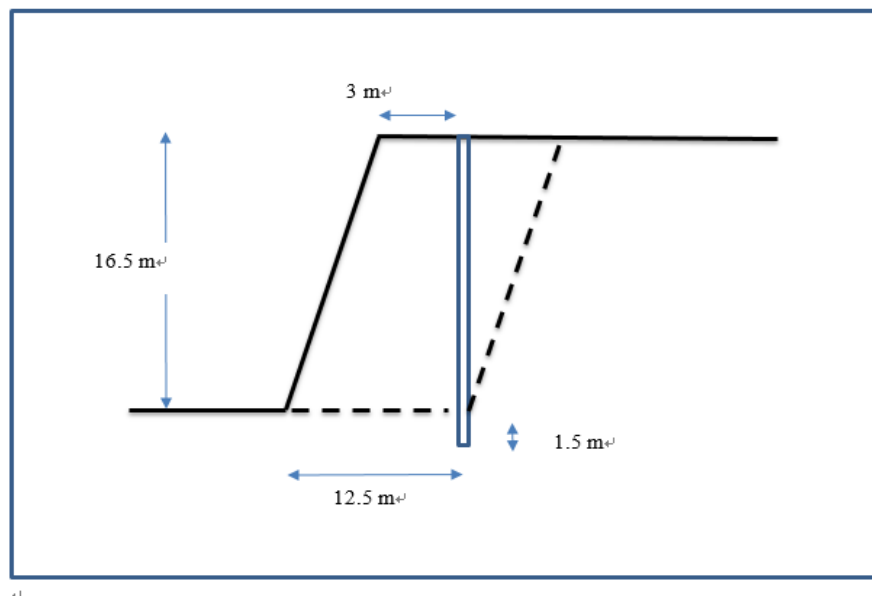
Assume that the diameter of the production drill hole is ø300 mm and bench inclination is 80º.

[10 Marks]

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Section B: [60 marks]

Question 2:   MATLAB Programming

The fly rock trajectory projected vertically into the air from the collar of a blast follows the Newtonian function **f (t)** representing the height above ground at interval time, **t**.

$$f(t) \equiv ut - \frac{g*t*t}{2}$$

Where u   =   intial velocity, 20m/s

   g   =   gravitational pool, 9.8m/s^2.

Plot the height of the rock above ground every 0.1 seconds using MATLAB.   **[20 Marks]**

Question 3:   AutoCAD

The following information is of a massive orebody for gold.

Geological Orientation of the deposit

The ore body strike length is 800m and with apparent thickness of 30m. The shaft is to be located at the center, off set in the hanging wall rock, perpendicularly 100m from where the ore body outcrops. The ore body dips @ 60 degrees.

Technical Summary

Dimensions of the shaft	:	4 * 2, 5 m
Main haulage	:	3 * 3, 5 m
Bearing of the strike	:	090°
Apparent thickness	:	30m
First level	:	75 ml (metre level)
Second Level	:	150 ml (metre level)
Third Level	:	225ml (metre level)

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i. Generate a cross section diagram through the center of the shaft and ore whilst showing the topography and all the three mining levels. **[15 Marks]**

ii. Draw a plan showing the orebody and shaft. **[5 Marks]**

Question 4: Databases Microsoft access.

The Human Resources data folder has information for employees of a mine

a) Capture the information in Microsoft Access to create an employee database **[8 Marks]**

b) Generate a form for the HR form to capture personal information when recruiting employees. **[4 Marks]**

c) The Manpower and Training department request list of all employees who are above 35 years on 31st of December so that they can plan refresher courses. Generate the list of the employees? **[4 Marks]**

d) Evaluate the mine leave days liability both in man hours and cash in lieu. **[4Marks]**

Question 5: Surpac Mining Design Software

The Geological data folder has geological information on the diamond drilling program conducted for Entuba Coal fields in Hwange. The bore dill hole data shows the core logging from the original surface, intercepts of Top of Coal (TC) and intercepts with the country sandstone footwall (FW). The coal seam is continuous from the wall and ranges between 9m – 13m.

Import the data into Surpac and create Digital Terrain Models (DTM) for the footwall contact, top of coal and natural topography. **[20 Marks]**

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