FACULTY OF ENGINEERING AND THE ENVIRONMENT

DEPARTMENT OF MINING ENGINEERING

MINE MANAGEMENT

EMI 5102

Final Examination Paper

January 2021

This examination paper consists of 4 pages

Time Allowed: **3 hours**

Total Marks: **100**

Examiner's Name: **Mr. R Nyirenda**

INSTRUCTIONS

1. This paper contains **ONE** section with **FIVE** questions.
2. Answer **QUESTION ONE** and **any other THREE questions**.
3. Each question **carries 25 marks**.
4. Where a question contains subdivisions, the mark value of each subdivision is shown in brackets.
5. Illustrate your answer, where appropriate, with large clearly labelled diagrams.
6. Start each question on a new page.
7. This paper comprises **4** printed pages.

Additional Requirements

Calculator

MARK ALLOCATION

Question 1 to 5	**25Marks**
Part Questions	**As shown in each part question**
Total Attainable	**100**

Question One

a) Using Mintzberg's contemporary model for managing, choose any 2 roles that you think are the most important for a mine manager to play. Briefly explain your answer. **[4 marks]**

b) For each of the following, describe 3 practical ways by which a shift boss ensures:

i. High operational efficiency by his/her team. **[6 marks]**

ii. High operational effectiveness by his/her team. **[6 marks]**

c) Explain the importance of either technical skills, conceptual skills or human skills to the following levels of management:

i. First line management. **[3 marks]**

ii. Middle management. **[3 marks]**

iii. Top management. **[3 marks]**

Question Two

a) Describe the 5 sections of a Statement of Work document used in project management. **[10 marks]**

b) i. Briefly explain 3 purposes of a project schedule. **[6 marks]**

ii. Differentiate between fast tracking and crashing in project schedule compression. **[4 marks]**

iii. Indicate 5 benefits of using PERT/CPM in project scheduling. **[5 marks]**

Question Three

a) Construct the CPM network described by the following set of development activities. **[20 marks]**

Activity	Description	Predecessor	Time (Weeks)
A	Sub-haulage extension	-	2
B	Material x-cut excavation	-	3
C	F/W vent drift	A	2
D	Access to service & transfer	A, B	4
E	Excavation of service & transfer	C	4
F	Excavation of scraper drifts	C	3

G	Prospect raises	D, E	5
H	Finger raises	F, G	2

b) Compute the following:

i. The length of each path in the network **[2 marks]**

ii. Critical path **[2 marks]**

iii. Project completion duration **[1 mark]**

Question Four

a) A quarry mine uses 5 000 boxes of explosive cartridges every year. The buying price is US$ 100 per box. The cost of replenishing the inventory levels is US$ 15 per order and the inventory holding cost is 20% of the purchase price per box per order. Given that no shortages should be incurred, calculate the following:

i. Economic Order Quantity, **[5 marks]**

ii. Optimum interval between orders, **[5 marks]**

iii. Minimum annual inventory costs **[5 marks]**

b) When conducting planned maintenance of dump trucks at a certain open pit mine, the Stores Department must supply a specific spare part to the Mobile Equipment Workshop at a rate of 9 spare parts per month. The ordering cost of this particular part is US$ 750 per order. In addition, the cost of having a shortage of this part is US$ 300 per part per day of shortage. The holding cost of each spare part is US$ 120 per day. Compute the maximum inventory level at the beginning of each month. **[10 marks]**

NB:

EOQ model with uniform demand	EOQ model with shortages
$EOQ = \sqrt{\frac{2 \times D \times C_o}{C_h}}$	$EOQ = \sqrt{\frac{2 \times D \times C_o}{C_h} \times \frac{C_h + C_o}{C_s}}$
$t = \frac{EOQ}{D} = \sqrt{\frac{2 \times C_o}{C_h \times D}}$	$t = \sqrt{\frac{2 \times C_o}{D \times C_h} \times \frac{C_h + C_s}{C_s}}$
$Minimum\,TC = \sqrt{D \times C_o \times C_h}$	$Min.TC = \sqrt{2 \times D \times C_o \times \frac{C_s}{C_h + C_s}}$

	$M = \sqrt{\frac{2 \times D \times C_o}{C_h} \times \frac{C_s}{C_h + C_s}}$

Question Five

a) Describe the 4 functions of a manager defined by Fayol. **[12 marks]**

b) i. As a mine manager at an underground operation, describe how you would re-enact the Hawthorn studies. **[8 marks]**

ii. Specify any 2 conclusions that you expect to get from your own version of the Hawthorn studies. **[5 marks]**

END OF EXAMINATION PAPER