PROGRAM	:	**BTech (Mining)**
SUBJECT	**:**	**ENGINEERING MANAGEMENT IVA (S5)**
SUBJECT CODE	**:**	**MGNA411**
EXAMINATION	**:**	**FINAL SUMMATIVE EXAMINATION**
DATE	**:**	**23 MAY 2019**
DURATION	:	**180 MINUTES**
TOTAL MARKS	**:**	**120**

EXAMINER	**:**	**Maelani Chauke**
MODERATOR	**:**	**Mr. Hein Strauss**
NUMBER OF PAGES	:	**7 PLUS FORMULAE SHEET**

INSTRUCTIONS:

1. **PLEASE** answer **ALL** questions
2. A question means all the sub-questions that appear under the heading of that question. All the sub-questions must be kept together under the heading of a specific question
3. Number all questions, and associated sub-questions **CLEARLY**
4. A formulae sheet is herein attached
5. The use of a calculator is permissible
6. All the relevant rules of the University of Johannesburg shall apply

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Question 1

1.1 Through the use of an appropriate figure, or some other form of visual representation, give an overview of the management process. Explain the salient aspects of the process

(10)

1.2 With reference to the management process, explain the 'organising' function. What are the purposes and benefits of the 'organising' function?

(6)

1.3 With reference to the organising function, explain the meaning of the following terms:

1.3.1 'Chain of command'

(2)

1.3.2 'Span of control'

(2)

[20]

Question 2

2.1 Define human resources management

(4)

2.2 List the typical activities in the process of human resource management

(4)

2.3 Explain the phases of the 'training process' through the use of an appropriate figure

(12)

[20]

Question 3

3.1 Briefly explain the requirements of a 'valid offer'.

(4)

3.2 With respect to co-creditors and co-debtors, explain the terms below:

3.2.1 Simple joint liability

(2)

3.2.2 Joint and several liability

(3)

3.2.3 Joint (common) liability

(1)

[10]

Question 4

The activities for a small engineering project are given in the table below.

Activity	Predecessor	Time (days)		
		a	m	b
A	-	8	8	6
B	-	7	7	4
C	B	3	5	6
D	A	5	6	13
E	A	2	13	18
F	B,D	6	8	7
G	C	7	8	7
H	C,F	6	6	8
I	D	3	6	2
J	E	15	17	18
K	G	3	9	12
L	H	8	4	11
M	I,J	7	7	12
N	G	12	15	17
O	L,M	2	3	11
P	O	6	7	9
Q	P	11	17	19

4.1 Prepare the data required for a full network analysis. Show all calculations and neatly tabulate the data

4.2 Construct the network diagram using the AON convention

4.3 Find the critical path and the earliest completion time for the project

4.4 Find the project duration associated with:

4.4.1 An 80% confidence level

4.4.2 A 60% confidence level

[30]

Question 5

5.1 With the aid of an appropriate figure, explain the transformation process (from inputs to outputs) in the context of operations management. Discuss the salient features of the process

(10)

5.2 List at least five advantages of 'flexible manufacturing systems'

(5)

5.3 List at least five purposes of inventory

(5)

[20]

Question 6

Your company's monthly expenses on electrical power is R 416 000 and is set to escalate by 1.8% per month. You are offered a power optimization system that would cut your power consumption by 10,5%. The system costs R 750 000 and lasts for a period of one year after which it must be replaced.

Evaluate this offer and substantiate your acceptance or rejection. Use a discount rate of 15%.

[20]

GRAND TOTAL MARKS = 120

MGNA411 – Formulae

Operations management	
Design capacity	*Maximum output under ideal conditions.*
Effective capacity	*Output estimated when constraints such as breakdowns, scheduling & quality are considered.*
Actual output	*Actual achievement.*
Efficiency	$Efficiency = \frac{Actual\ output}{Effective\ Capacity} \times 100$
Utilisation	$Utilisation = \frac{Actual\ output}{Design\ capacity} \times 100$
Productivity	$Productivity = \frac{Output}{Input}$
Project management	
Expected completion	$TE = \frac{a + 4m + b}{6}$
Standard deviation	$\sigma^2 = \left[\frac{b - a}{6}\right]^2$
Probability Z value	$Z = \frac{D - \mu}{\sqrt{\sigma_\mu^2}}$
Time value of money	
Simple interest	$I = Pni$
Compound interest	$F = P(1 + i)^n \quad P = \frac{F}{(1 + i)^n}$
Annuity	$F = A\left[\frac{(1 + i)^n - 1}{i}\right] \quad P = A\left[\frac{(1 + i)^n - 1}{i(1 + i)^n}\right]$
Return on investment	$ROI = \frac{Average\ annual\ profit}{Original\ investment} \times 100$
Net Present Value	$NPV = \sum_{t=1}^{n} \frac{CF_t}{(1 + k)^t} - I$
Payback period	*Time taken to gain financial return equal to the original investment.*